

**Bathymetric Distributions of Pacific Ocean Perch
(*Sebastes alutus*) off British Columbia.**

**I. Mean Length-at-age *Versus* Depth for
Specimens Caught by On-bottom Trawl off
Northwest Queen Charlotte Islands and in Hecate
Strait and Queen Charlotte Sound, 1966-78**

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by

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ABSTRACT

Westrheim, S.J., and Stanley, R.D. 2006. Bathymetric distributions of Pacific ocean perch (*Sebastes alutus*) off British Columbia. I. Mean length-at-age *versus* depth for specimens caught by on-bottom trawl off northwest Queen Charlotte Islands and in Hecate Strait and Queen Charlotte Sound, 1966-78. Can. Manuscr. Rep. Fish. Aquat. Sci. 2764: vi + 78 p.

This report investigated the relationship of mean-length-at-age vs depth for Pacific ocean perch (*Sebastes alutus*), based on on-bottom trawl catches on important trawling grounds in British Columbia waters. Catch samples from both the R/V *G.B. Reed* (1966-84) and several commercial trawlers (1978-97) were utilized. Important grounds, for which adequate data were available, were off the northwest coast of the Queen Charlotte Islands (MSAs 1W and 2AW), Moresby Gully (south Hecate Strait and north Queen Charlotte Sound), and Goose Island Gully (Queen Charlotte Sound). Emphasis was placed on 1980-99, when all grounds were exploited, and the refined age-determination method (break and burn) was used. Investigation of seasonal variations in the relationship was not possible, because of inadequate data for October-March.

Relationship of mean-length-at-age vs depth exhibited three patterns: (1) a generally horizontal trend, only one prominent nadir (MSA 1W); (2) a generally downward trend, with several prominent nadirs (MSA 2AW); and (3) fairly strong nadirs in the arrays, where the bathymetric range was extensive (Moresby and Goose Island gullies). Three of the patterns suggest that linear-growth analysis of Pacific ocean perch must include depth as a variable. Of particular interest is the evidence for the existence of two bathymetrically separate "groups" of Pacific ocean perch with similar mean-length-at-age arrays, in Moresby and Goose Island gullies. Included is a review of other studies dealing with intra-species variations of Pacific ocean perch off British Columbia and nearby waters.

RÉSUMÉ

Westrheim, S.J., and Stanley, R.D. 2006. Bathymetric distributions of Pacific ocean perch (*Sebastes alutus*) off British Columbia. I. Mean length-at-age *versus* depth for specimens caught by on-bottom trawl off northwest Queen Charlotte Islands and in Hecate Strait and Queen Charlotte Sound, 1966-78. Can. Manuscr. Rep. Fish. Aquat. Sci. 2764: vi + 78 p.

La répartition des tailles et le rapport des sexes (% mâles) ont été comparés pour les sébastes à longue mâchoire (*Sebastes alutus*) capturés au chalut au-dessus du fond et ceux capturés au chalut de fond dans le détroit de la Reine-Charlotte, le Sud du détroit d'Hécate et au large de la côte Ouest de l'île de Vancouver entre 1967 et 1989. Pour cette étude, les auteurs ont utilisé les données recueillies à bord du *NO G.B. Reed* et de plusieurs chalutiers affrétés, nationaux, commerciaux et étrangers. Les chalutiers étrangers n'ont opéré qu'au large de la côte Ouest de l'île de Vancouver (avec des observateurs canadiens à leur bord), et ciblaient manifestement les merlus du Pacifique (*Merluccius productus*).

Dans la région du détroit de la Reine-Charlotte et du détroit d'Hécate, trois types de chalut au-dessus du fond ont été utilisés, mais seul le chalut Engel (modifié ou non) a été utilisé pour les bancs de poissons situés au-dessus du fond. Des photocopies des échogrammes de la sondeuse du *G.B. Reed* ont été présentées comme exemples montrant des bancs de poissons au-dessus du fond. Principaux résultats : (1) les prises capturées au chalut au-dessus du fond comprenaient des sébastes à longue mâchoire, d'autres espèces de sébastes, des merlus du Pacifique et des goberges de l'Alaska (*Theragra chalcogramma*); (2) les prises importantes d'autres espèces de sébastes se sont limitées aux fonds accidentés où un nombre réduit, voire nul, de sébastes à longue mâchoire ont été capturés, l'espèce la plus commune étant le Sébaste à raie rouge (*S. proriger*). (3) les proportions de sébastes à longue mâchoire présents dans les traits de chalut effectués au-dessus du fond ne présentaient aucune corrélation avec les proportions observées pour les traits de chalut effectués sur le fond à partir du *G.B. Reed*; (4) la répartition des tailles chez les sébastes à longue mâchoire présents dans les traits de chalut effectués au-dessus du fond est resté unimodale, contrairement aux répartitions bimodales ou multimodales observées pour les traits de chalut effectués sur le fond; (5) pour les traits de chalut Engel, les longueurs moyennes des sébastes à longue mâchoire se sont révélées supérieures et le rapport des sexes ont été plus faible (moins de mâles) que pour les traits effectués avec les autres chaluts sur le fond; (6) l'absence générale de petits (jeunes) poissons dans les traits de chalut Engel est restée inexpiquée; (7) la répartition des tailles chez les spécimens mâles ne varie que peu lors de tests basés sur des échantillonnages doubles à partir des traits du chalut Engel; (8) aucun écho de poissons au-dessus du fond n'a été détecté lorsque la profondeur était supérieure à 119 brasses (218 m).

Voici les principaux résultats obtenus pour la région Ouest de l'île de Vancouver : (1) la répartition des tailles chez les sébastes à longue mâchoire présents dans les traits de chalut effectués au-dessus du fond et sur le fond était unimodale ou bimodale, sans corrélation claire avec le sexe des poissons ou la profondeur du trait; (2) de même,

aucune tendance n'a pu être observée pour les longueurs moyennes selon l'âge, quel que soit le sexe; (3) la relation ondulatoire entre la longueur moyenne et la profondeur, pour les prises effectuées au-dessus du fond et sur le fond, était analogue à une relation similaire, observée pour les longueurs moyennes selon le groupe d'âges pour les prises effectuées au chalut de fond, et mentionnée dans un rapport précédant concernant la région des détroits de la Reine-Charlotte et d'Hécate; (4) les rapports des sexes étaient constamment et, habituellement, largement inférieurs dans les traits effectués au chalut au-dessus du fond que dans les traits effectués sur le fond; (5) le résultat le plus surprenant fut peut-être la prise occasionnelle d'une grande quantité de sébastes à longue mâchoire adultes au-dessus du fond, à des profondeurs allant jusqu'à 460 m (251 brasses), lors de traits pour lesquels la ralingue supérieure était maintenue à 105-270 m (57-148 brasses) au-dessus du fond.

INTRODUCTION

Pacific ocean perch (*Sebastes alutus*) exhibit both horizontal (on-bottom) and vertical (off-bottom) bathymetric distributions. Relationships of mean lengths-at-age with depth have received little attention in the former case, and none in the latter case.

On-bottom distribution of Pacific ocean perch has been reported throughout the northeast Pacific ocean (Alverson 1960; Lyubimova 1963; Paraketsov 1963; Westrheim 1970, 1973; Gunderson 1974). Off southwest Vancouver Island (Area 3C; Fig. 1) Westrheim (1973) reported that bathymetric distribution varied by season, size composition, age composition, and mean length at age. The seasonal relationships of mean length *versus* depth, for selected age groups, are shown in Fig. 2. To date, no comparable investigation has been undertaken elsewhere, except off northwest Washington State (Areas 3B and 3Cs¹) (Gunderson 1974).

The purpose of this report is to investigate the relationship between mean length-at-age and depth for Pacific ocean perch, caught by on-bottom trawl off British Columbia.

MATERIALS AND METHODS

VESSELS

Investigations began with the R/V *G.B. Reed*, a side-trawler of 752 gross tons, and 172 ft overall length (Westrheim 1970). "Other vessels" included chartered commercial stern trawlers undertaking explorations and/or surveys, and commercial stern trawlers, whose landing records provided information on location and depth of catches, and age-length data by time, location, and depth.

R/V *G.B. Reed*

Data sources were published reports of the vessel's activities (Table 1), and PBS Scientific Archives for age-length data.

Prior to 1971, bathymetry was poorly known for grounds known to, or suspected to, contain Pacific ocean perch. During 1971-73, expeditions were undertaken to investigate likely grounds, by echo-sounder and on-bottom trawl (Westrheim 1972, 1974). Activities centered on northwest Queen Charlotte Islands (Area 5E), southern Hecate Strait (Area 5C), and Queen Charlotte Sound (Areas 5B and 5An²). The grounds delineated bathymetrically were Langara Spit (5E), Moresby Gully (5C+5B), Mitchell's Gully (5B), and Goose Island Gully (5B+5An). Langara Spit and Moresby Gully were unknown to the Canadian and U.S. trawlers. Mitchell's Gully was partially known, and

¹ Area 3Cs is that portion of Area 3C which lies within the U.S. Extended Economic Zone, established in 1977. It comprises approximately one third of the area in 3C. Area 3Cn is that portion of Area 3C which lies within the Canadian EEZ.

² Area 5An is that portion of Area 5A lying north of Cape Scott.

Goose Island Gully was well-known, although their bathymetries had not been delineated.

The on-bottom trawl was a 500-mesh eastern-type trawl, with a 1.5"-mesh liner in the intermediate and codend, 19" rubber bobbins on the groundrope, 35-fm sweeplines, and 1400-lb Brompton otterboards (Harling *et al.* 1970).

Trawling stations were located, along selected tracklines, at the mid-point of each 20-fathom depth interval—90 fms for the 80-99 interval, *etc.* Trawlability was determined from echograms and past experience.

Estimation of numbers and weight caught, and size composition by sex, followed the 6-tub sampling procedure of Westrheim (1968). Otoliths, providing length-at-age data, were collected from all specimens in the middle two tubs.

Other Vessels

Data source was the groundfish data base, at the Pacific Biological Station (PBS), which provided landing records of commercial trawlers, and biological samples from some of their landings, as well as from catches at sea of research vessels (government or chartered)³. Prior to 1996, catch data from individual commercial trawlers were obtained from trawl captains, who volunteered the information at the time of landing. These records provided catch estimates by ground and depth (Fargo *et al.* 2000). Such data were not obtained for all landings. After 1995, observers were placed aboard over 90% of the B.C. trawlers, and detailed records were obtained for each trawl haul. Table 2 lists the published post-1976 reports dealing with research cruises involving Pacific ocean perch.

Landing records were provided in a spreadsheet format. The column headings were year, month, major statistical area (referred to as Area in this report), minor statistical area (MSA), locality (ground), depth (m), and weight (t). Areas and MSAs, subdivisions of Areas, are geographically defined (Fig. 1). Localities, usually subdivisions of MSAs, are loosely defined, and named, by the fishermen.

Age-length records were also provided in a spreadsheet format. The column headings were year, month, area, MSA, locality (ground), depth (m), fork length (mm), sex, and age.

All records from "other vessels" were initially grouped by "ground", quarter-year, and 40-meter depth interval (40-79, *etc.*). The latter approximated the 20-fm depth intervals used for the *G.B. Reed* data, prior to 1979. Selection of "grounds" was arbitrary, and included one Area (3D), two Sub-Areas⁴ (5As, 3Cn), three MSAs (1W,

³ Biological data such as age-length were not segregated by source in the data base, to maintain confidentiality.

⁴ Hereafter referred to as areas.

2AW, 2BW), three gullies (Moresby, Mitchell's, Goose Island), and one locality (Goose Island Bank Slope).

No description was found of sampling procedures for landings at processing plants. Various reports dealt with sampling at sea aboard chartered commercial vessels. However, in the latter case, these data could not be isolated in the data base.

Descriptions of trawling gear used by chartered commercial trawlers was first reported by Nagtegaal *et al.* (1980), including the "rock hopper" gear devised to trawl on rough bottom. This gear was not known during 1970-74.

TRAWLING GROUNDS

Heavy glaciation during the Pleistocene period carved the bottom of Queen Charlotte Sound and Hecate Strait into a number of troughs and banks (Luternauer 1972), many of which were unnamed when the *G.B. Reed* 1972-73 trawl survey was undertaken (Westheim 1974). The latter author introduced "more descriptive names". Among these (with Luternauer's in parentheses) were Goose Island Gully (South Trough), Mitchell's Gully (predates Central Trough), and Moresby Gully (North Trough).

G.B. Reed Explorations

Echo-sounder surveys were undertaken in two regions—West Queen Islands (5E) and Hecate Strait-Queen Charlotte Sound (5C+5B+5An) (Fig. 1). However, only in the latter were systematic trawl surveys undertaken—in Moresby, Mitchell's, and Goose Island gullies (Fig. 3).

Moresby Gully

This ground is located in southern Hecate Strait (5C) and northern Queen Charlotte Sound (5B). Estimated total area, at 80-259 fms (146-474 m), was 2,239 sq nm, of which 34% was deemed trawlable (Table 3). Trawl surveys were conducted in June-July 1973, September 1974, and August-September 1978 (Table 1).

Mitchell's Gully

This ground is located in northern Queen Charlotte Sound (5B). Estimated area, at 80-199 fms (146-364 m), was 517 sq nm, of which 69% was deemed trawlable (Table 3). Trawl surveys were undertaken in August 1971, June 1972, September 1973, September 1976, and August-September 1977 (Table 1).

Southwest Slope Goose Island Bank

This ground is located in western Queen Charlotte Sound (5B), between Mitchell's and Goose Island gullies. Estimated area, at 80-199 fms (165-348 m) was

295 sq nm, of which 4% was deemed trawlable (Table 3). Exploratory trawling was undertaken in 1972 and 1973 (Table 1).

Goose Island Gully

This ground is located in south Queen Charlotte Sound (5B+5An). Estimated area, at 80-159 fms (146-291 m), was 993 sq nm, of which 89% was deemed trawlable (Table 3). Trawlability was deemed 0% beyond 159 fms. A total of 10 trawl surveys were undertaken during June-October 1966-77 (Table 1).

Outer Queen Charlotte Sound

This "ground" lies in western Queen Charlotte Sound, outside 159 fms (291 m), and extends from Cape St. James to Cape Scott (Fig. 1). An echo-sounder and trawl survey was conducted in June 1974 (Table 1). Estimated area, at 160-499 fms (293-913 m) was 521 sq nm, of which 5% was deemed trawlable, with the *G.B. Reed* on-bottom trawl.

Other Vessels

During 1978-97, trawl surveys took place in Areas 5E, 5C, 5B, 5A, 3D, and 3Cn. No estimates of area by depth were reported (Table 2).

AGE DETERMINATION

Age determination was initially based on surface readings of the otoliths (Westrheim 1973). Ages greater than 20 were labeled ">20". This method was initially thought to be adequate up to about ages 22-24 (Beamish 1979). Subsequently the cross-section method replaced surface readings. Using the improved method, Shaw and Archibald (1981) reported maximum ages of 72 y in Area 5B (N = 797) and 70 y in Area 5C (N = 200), for samples collected in 1979. A third evaluation by Stanley (1987) reported that surface readings were questionable after age 16, with respect to cross-section readings.

Only even-numbered ages 10 through 20 were used, to correspond with the age groups used in Westrheim (1973). For 1980-99 data, all age determinations were based on the cross-section method.

AGE-LENGTH

R/V *G.B. Reed*

Records were extracted from the PBS Scientific Archives and the PBS Groundfish Data Base (GFBio). All known records were not found. Otoliths were collected, and read, from virtually all hauls in each cruise. For example, age-readings

were not found for Moresby Gully in 1973 and 1978. There were 7,171 otoliths (65 hauls) collected during June-July 1973 (Westrheim *et al.* 1973), of which an estimated 5,626 (51 hauls) were collected in Moresby Gully. Similarly, during August-September 1978 (Harling *et al.* 1978), 10,660 otoliths (62 hauls) were collected, of which an estimated 9,113 (53 hauls) were collected in Moresby Gully. The estimates were necessary, because each cruise report included only total numbers of otoliths collected for the entire cruise, which involved two or more grounds.

Other Vessels

Records were extracted from the PBS Groundfish Data Base (GFBio). Many records have not yet been transferred from tape to the data base (Sinclair and Olsen 2002). The proportion missing is not known.

LENGTH-AT-AGE vs DEPTH

"Numerical" descriptions of mean-length-at-age vs depth arrays involved two phenomena—trends and nadirs. Trends were delineated by the difference between age-group lengths at the deepest and shallowest depths (D-S). Nadirs were delineated by the difference (Dn-S) between age-group lengths at the depth of the nadir (Dn), if present, and at the shallowest depth (S). Nadirs were arbitrarily defined as prominent (Dn > 9 mm) or marginal (Dn < 10 mm). Analysis was limited to arrays containing at least four age groups, each of whose mean length was based on at least five specimens.

RESULTS

GENERAL

Table 4 contains commercial landings of Pacific ocean perch, by 5-year period, region, and ground, during 1965-99. Among regions, 72-94% of the landings occurred during 1980-99. Within regions, comparable proportions were 13-50% for WQCI, 50-100% for HSQCS, and 89-100% for WVI.

Table 5 contains proportions of usable landing records (known depth) during 1980-99, by 5-year period and major area. Proportions varied moderately among major areas during 1980-99 (66-83%), but only slightly for 1995-99 (97.3-99.7%). The substantial increase in percentage during 1995-99 was due to the inauguration of record-keeping by observers at sea during fishing operations, after 1995.

Table 6 contains a general summary of the length-at-age data. Analyses of *G.B. Reed* data are limited to Moresby and Goose Island gullies. Analyses of data from "other vessels" are limited to MSAs 1W and 2AW, and Moresby and Goose Island gullies.

The seasonal aspect to mean-length-at-age vs depth was not investigated, because most records were fragmentary during fall and winter. Research-vessel cruises only took place during May-October, and few samples from commercial landings were taken

during October-March. Thus, emphasis was placed on the spring-summer (Quarters II and III) period, in most cases.

MSA 1W (5E)

Other Vessels

Research-vessel cruises were conducted in 1978, 1979, 1989, 1993, 1996, and 1997 (Table 2).

Commercial landings. The 1965-99 values totaled 13,124 t, of which 98% occurred during 1980-99 (Table 4). MSA 1W accounted for 50% of the 1980-99 landings from the West Queen Charlotte Islands Region. During 1980-99, quarterly landings ranged from 1,566 t (Q IV) to 6,932 t (QII), and Quarters II+III accounted for 72% (Table 7). Quarterly mean depths declined from 325 m (178 fms) in QI to 292 m (160 fms) in QIII, then increased to 298 m (163 fms) in QIV. Depth differences were not significant due to the large values of the standard deviations (41-71 m). Otoliths totaled 2,862, of which 70% (2,011) were collected in Quarters II+III.

For Quarters II+III, depth range was 180-540 m (98-295 fms), but 99% of the landings originated from six 40-m depth intervals—220-420 m (120-230 fms) (Table 8). Mean depth was 307 m (168 fms), and S.D. was 44 m. Curiously, modal depth was shallower for QI+IV (260 m; 142 fms) than for QII+III (300 m; 164 fms).

Mean-length-at-age vs depth. Based on the aforementioned qualifications, analysis was limited to Quarters II+III, six 40-m depth intervals (220-420 m), and six age groups (10-20), except female age-group 18 (Tables 9 and 10). Male arrays exhibited an essentially horizontal trend, except that at 420 m, one of the two age groups (12) exhibited a sharp increase in mean length over that at 380 m (Fig. 4). D-S values were negative for age-groups 10 (-3 mm) and 16-20 (-9 to -35), and positive for age-groups 12 (+12) and 14 (+6) (Table 11). All six arrays exhibited nadirs, but only one was prominent—age-group 20 (-43 mm) at 340 m. Female arrays exhibited no consistent trend (Fig. 4). Five age groups qualified for analysis (10-16 and 20). D-S values were negative for age-groups 10 (-18 mm) and 16 (-23); and positive for age-groups 12 (+14), 14 (+3), and 20 (+5). Three arrays exhibited nadirs, but none was prominent.

MSA 2AW (5E)

Other Vessels

Research-vessel cruises were conducted in 1978, 1979, 1989, 1993, 1996, and 1997 (Table 2).

Commercial landings. The 1965-99 values totaled 12,375 t, of which 78% occurred during 1980-99 (Table 4). MSA 2AW accounted for 37% of the 1980-99 landings from the West Queen Charlotte Islands Region. During 1980-99, quarterly

landings ranged from 1,096 t (QIII) to 2,891 t (QIV), and Quarters II+III accounted for 38% (Table 7). Quarterly mean depths declined from 337 m (184 fms) in QI to 288 m (157 fms) in QIII, then increased to 302 m (165 fms) in QIV. Depth differences were not significant due to the large values of the standard deviations (43-57 m). Otoliths totaled 1,006, of which 39% (388) were collected during Quarters II+III.

For Quarters I+IV, depth range was 140-700 m (77-383 fms), but 97% of the landings originated from six 40-m depth intervals—220-420 m (120-230 fms) (Table 8). Mean depth was 325 m (177 fms), and S.D. was 58 m. For Quarters II+III, depth range was 180-660 m (98-361 fms), but 99% of the landings originated from six 40-m depth intervals—220-420 m. Mean depth was 303 m (166 fms), and S.D. was 53 m.

Mean-length-at-age vs depth. Based on the aforementioned qualifications, analysis involved Quarters I-IV, six 40-m depth intervals (220-420 m), and four age groups (10-16) (Tables 9 and 10). Male arrays involved only four age groups (10-16), and exhibited a declining trend, except that at 380 m, three of the four age groups exhibited a sharp increase in mean length over that at 340 m (Fig. 5). Only age-group 10 provided a mean length at 420 m. D-S values were negative for all four age groups (-10 to -26 mm) (Table 11). Three age-group arrays exhibited nadirs, and two were prominent—age-groups 12 (-34 mm) and 16 (-18 mm), both at 340 m (186 fms). Female arrays exhibited a general decline for all four age groups (Fig. 5). D-S values were negative for all four age groups (-11 to -25 mm). Three arrays exhibited nadirs, all prominent—age-groups 10 (-12 mm), 14 (-29), and 16 (-34).

MORESBY GULLY (5C+5B)

R/V G.B. Reed (5C)

Cruises were conducted in 1973, 1974, and 1978 (Table 1).

A total of 118 usable trawl hauls were completed in Area 5C, over a depth range of 90-230 fms (165-421 m) (Appendix table 7). None was undertaken in Area 5B. Among-year totals were 40 (June-July 1973), 33 (September 1974), and 45 (August-September 1978). The PBS archives yielded mean-length-at-age data only for the September 1974 survey.

Catch rates. For September 1974, values declined from 2,291 fish/h at 110 fms (201 m), to 418 fish/h at 230 fms (421 m) (Table 12). A similar trend was noted for the 1973 and 1978 data (Appendix table 7).

Mean-length-at-age vs depth. The September 1974 array consisted of five 20-fm depth intervals--110-190 fms (201-348 m) (Tables 13 and 14). Male arrays involved five age groups (12-20), and the bathymetric trend was substantially downward (Fig. 6). D-S values were all negative (-18 to -32 mm) (Table 15). Two age groups exhibited nadirs, both prominent, and both at 170 fms (311 m)—age-groups 14 (-28 mm) and 18 (-24). Female arrays involved only two age groups (18 and 20, and both exhibited a substantial

downward trend (Fig. 7). Both D-S values were negative (-31 and -38 mm), and both exhibited prominent nadirs at 190 fms (348 m), -41 and -35 mm, respectively (Table 15). Both male (Fig. 6) and female (Fig. 7) patterns generally resembled those reported for Area 3C during September 1965-66 (Fig. 2).

Other Vessels (5C+5B)

Research cruises were conducted in June 1981 and July 1989 (Table 2).

Commercial landings. The 1965-99 total was 31,900 t, of which 98% occurred during 1980-99 (Table 4). Moresby Gully accounted for 59% of the 1980-99 landings from the Hecate Strait-Queen Charlotte Sound Region. During 1980-99, quarterly landings ranged from 3,383 (QI) to 14,850 (QII) t, and Quarters II+III accounted for 69% (Table 16). Quarterly mean depths declined from 294 m (161 fms) in QI to 227 m (124 fms) in QIII, then increased to 258 m (141 fms) in QIV. Depth differences were not significant due to the large values of the standard deviations (37-57 m). Otoliths totaled 1,961, of which 63% were collected in Quarters II+III. For Quarters II+III, depth range was 20-580 m (11-317 fms), but 88% of the landings was accounted for in five depth intervals--180-340 m (98-186 fms) (Table 12).

Mean-length-at-age vs depth. Ten 40-m depth intervals (220-580 m; 120-317 fms) and six age groups (10-20) were eligible for analysis (Tables 13 and 14). Depth range was substantially more extensive than that for the *G.B. Reed* data. Male arrays exhibited a pronounced sharp division between "shallow" and "deep" groups, which was partially hinted at in the *G.B. Reed* data (Fig. 6). D-S values were negative for age-groups 12 (-1 mm), 16 (-4), and 18 (-4); zero for 14; and positive for 10 (+1) and 20 (+11) (Table 15). Four arrays exhibited nadirs, but only two were prominent--16 (-12 mm) at 460 m, and 18 (-10) at 340 m. Fragmentary data probably precluded identification of other prominent nadirs. Female arrays were enigmatic, because of missing data at 340 m (age-groups 10 and 16-20) and at 380 m (age-groups 10-16) (Figure 7). D-S values were negative for age-groups 14-20 (-8 to -17), and positive for age-groups 10 (+22) and 12 (+19) (Table 15). Five arrays exhibited nadirs, and four were prominent--10 (-19 mm) at 340 m; 14 (-28) and 18 (-12) at 300 m; and 20 (-21) at 540 m. However, the fragmented arrays probably precluded accurate locations of nadirs.

GOOSE ISLAND GULLY

R/V *G.B. Reed*

Cruises were completed in 1966, 1967, 1969, 1970, 1971, 1972, 1973, 1976, and 1977 (Table 1). Analysis was limited to June-September, and those cruises with at least 10 hauls per cruise.

Catch rates. The June-September depth range was 90-150 fms (165-275 m) (Table 17). Mean values generally increased with depth, from 1,345 fish/h at 90 fms (165 m) to 2,498 fish/h at 150 fms (275 m).

Mean-length-at-age vs depth. Four 20-fm depth intervals (90-150 fms; 165-275 m) and six age groups (10-20) were involved (Tables 18 and 19). Male arrays exhibited a general rise and decline over the limited depth range (Fig. 8). D-S values were negative for age-groups 14-20 (-6 to -16 mm), and positive for age-groups 10 (+3) and 12 (+2) (Table 20). One nadir (non-prominent) occurred, at age-group 14 (-2 mm). Female arrays exhibited a similar pattern as that of the males (Fig. 9). D-S values were negative for age-groups 10 (-2 mm) and 16-20 (-10), and positive for age-groups 12 (+11) and 14 (+6). There were no nadirs.

Other Vessels

Research cruises occurred in 1979, 1983, 1984, 1989, 1994, and 1995 (Table 2).

Commercial landings. The 1965-99 total was 31,242 t, 50% of which occurred during 1980-99 (Table 4). The 1980-99 landings accounted for 29% of the total from the Hecate Strait-Queen Charlotte Sound Region. During 1980-99, quarterly landings ranged from 619 t (QI) to 8,079 t (QII), Quarters II+III accounted for 84% (Table 16). Quarterly mean depths declined from 219 m (120 fms) in QI to 200 m (109 fms) in QIII, then increased to 228 m (125 fms) in QIV. Depth differences were not significant due to the large values of the standard deviations (43-54 m). Otoliths totaled 2,069, of which 93% were collected in Quarters II+III. For Quarters II+III, depth range was 20-660 m (11-361 fms), but 94% of the landings were reported from four 40-m depth intervals—140-260 m (77-142 fms) (Table 17).

Mean-length-at-age vs depth. Analysis was limited to Quarters II+III, ten 20-m depth intervals (140-500 m; 77-273 fms) and six age groups (10-20), except for male age-group 20 (Tables 18 and 19). Male arrays suggest the presence of two groups of Pacific ocean perch (Fig. 8), and are similar to those for Moresby Gully (Fig. 6). D-S values were negative for all six age-groups (-5 to -49 mm) (Table 18). Three nadirs were noted, but only two were prominent—age-groups 14 (-13 mm), at 300 m, and 18 (-18), at 260 m. Female arrays were somewhat similar to those of the males (Fig. 9). D-S values were negative for age-groups 10-14 (-24 to -31 mm), 18 (-7), and 20 (-8); and positive for age-group 16 (+1) (Table 20). Five arrays exhibited nadirs, and three were prominent—age-groups 10 (-22) at 340 m; 14 (-13) at 300 m; and 20 (-13) at 220 m.

Although less than 6% of the landings were reported from intervals deeper than 260 m (Table 17), a similar situation occurred in the arrays from Area 3C during September 1965-66 (Fig. 2). Subsequent records for Area 3C in February 1969 revealed the principal source of catches was in the 210-fm (384 m) and 230-fm (421 m) depth intervals. The latter involved a different group of Pacific ocean perch, presumably not available to the on-bottom trawl during September.

SUMMARY AND DISCUSSION

The purpose of this report is to investigate the relationship of mean-length-at-age with depth, for Pacific ocean perch caught by on-bottom trawl on important grounds off British Columbia. Sources of data were exploratory/survey cruises of the R/V *G.B. Reed* and chartered commercial trawlers, commercial landings, and biological samples therefrom. Data from chartered commercial trawlers, and commercial landings, were grouped as "other vessels" to preserve confidentiality.

During 1971-73, the R/V *G.B. Reed* was utilized to conduct echo-sounder and on-bottom-trawl surveys on grounds known to, or likely to, contain Pacific ocean perch. Echo-sounder surveys delineated important grounds off northwest Queen Charlotte Islands, and in southern Hecate Strait and Queen Charlotte Sound. Important grounds for which trawl surveys were also undertaken were Moresby, Mitchell's, and Goose Island gullies, all in the Hecate Strait-Queen Charlotte Sound Region. Moresby Gully was unknown, Mitchell's Gully was partially known, and Goose Island Gully was well known, to the Canadian and U.S. trawl fleets. However, their respective bathymetries had not been delineated.

Reports of "other vessel" activities were limited to those during 1980-99. Analyses were limited to principal grounds—MSA 1W, MSA 2AW, Moresby Gully, and Goose Island Gully. Commercial landings were generally small prior to 1980 from all grounds, except Mitchell's and Goose Island gullies. A consistent seasonal pattern of landings was evident in all four study areas, namely a decline in mean depth from Quarter I through Quarter III, then an increase in Quarter IV. Statistical significance was precluded by the large standard deviations. However, the latter values exhibited the same trend as landings, except for those for Moresby Gully.

Refined age-determination procedures were in effect by 1980.

Seasonal patterns of mean-length-at-age vs depth were not delineated, because of limited data for the autumn-winter period—no research-vessel cruises, and few biological samples from commercial landings.

Relationship of mean-length-at-age vs depth exhibited three patterns: (1) a generally horizontal trend, with only one prominent nadir (MSA 1W); (2) a generally downward trend, with several prominent nadirs (MSA 2AW); and (3) fairly strong nadirs in the arrays, where the bathymetric range was extensive (Moresby and Goose Island gullies). Patterns 2 and 3 suggest that linear-growth analysis of Pacific ocean perch must include depth as a variable. This phenomenon was not discovered until trawlers were able to fish at greater depths and on rougher bottom. Of particular interest is the evidence for the existence of two bathymetrically separate "groups" of Pacific ocean perch with similar mean-length-at-age arrays, in Moresby and Goose Island gullies. Other grounds not included in this analysis may well provide evidence of intra-species separations, if adequate data become available in the future.

The phenomenon of within-species variation of Pacific ocean perch, in British Columbia and nearby waters, was first propounded by Gunderson (1972), and subsequently by Westrheim (1973, 1975), Sekarak (1975), Gunderson *et al.* (1977), Leaman and Kabata (1987), Seeb and Gunderson (1988), Gunderson (1997), and Withler *et al.* (2001).

Gunderson (1972) reported that "aggregations" within Queen Charlotte Sound (5B+5An) exhibited considerable variation in length and growth, even when narrowly defined month-depth strata were considered. He suggested that growth analysis include aggregations as a variable.

Westrheim (1973) reported that growth analysis of Pacific ocean perch was complicated by bathymetric and geographic variations in age-length relationships. Geographically, he suggested that Dixon Entrance (Area 5E) was the boundary between Gulf-type and B.C.-type adults. Furthermore, he noted variations in mean length of juveniles within B.C. waters. Bathymetrically, off southwest Vancouver Island (3C), two partially mixed stocks were delineated, with near-opposite seasonal availability maxima.

Gunderson (1974) reported similar results to those of Westrheim (1973) from his studies of Pacific ocean perch, during 1967-72, in adjacent areas off the northwest coast of Washington State (3Cs+3B).

Westrheim (1975) reported a bathymetric difference in gonad development of Pacific ocean perch off southwest Vancouver Island (3C). The "deep water" males developed later than the "shallow water" males, but the females exhibited the reverse phenomenon.

Sekarak (1975) investigated the relationships of various rockfish species based on their parasite fauna, of which mostly-mature stages were identified to species level. During 1969-71, Pacific ocean perch samples were collected in Area 3Cn, Goose Island Gully, and off Cape Ommaney (S.E. Alaska) and Icy Bay (E. Gulf of Alaska). Intensity⁵ of infection correlated with fish size, but not sex or season. Intensity on individual specimens differentiated Pacific ocean perch geographically from Area 3Cn, Goose Island Gully, and Gulf of Alaska; and bathymetrically in Area 3Cn and Cape Ommaney. The author suggested that possible indicator parasites were *Brachiella robusta* (copepod) for geographical differentiation, and for bathymetric differentiation, *Colobomatus kyphosus* (copepod) and *Opechona alaskensis* (trematod).

Gunderson *et al.* (1977) reported that size and age composition differed substantially between Goose Island, Mitchell's, and Moresby gullies, but did not suggest genetic difference. Their explanation was different exploitation histories.

⁵ The American Society of Parasitologists (ASP) defines "intensity" as the number of individuals of a parasite species in a host (Margolis *et al.* (1982).

Leaman and Kabata (1987) investigated the prevalence⁶ and intensity of the gill parasite *Neobrachiella robusta* (Copepoda) (all life stages) on Pacific ocean perch collected during October-November 1985. Collections came from five presumptive stocks (SW Vancouver Island, Goose Island Gully, Moresby Gully, off Rennell Sound (MSA 2AW), and Langara Spit (MSA 1W). Stocks could be separated by population structure of the parasite, and/or prevalence and intensity of infection. However, the technique requires groups of fish, rather than individual specimens.

Seeb and Gunderson (1988) conducted an allozyme analysis of Pacific ocean perch using samples collected from Washington State to the Bering Sea. They concluded that genetic differentiation was only evident at the extremes of the distribution. They found no difference between samples from Goose Island, Mitchell's, and Moresby gullies.

Gunderson (1997) compared results of trawl surveys off northwest Washington State (3B+3Cs) with those immediately north in Area 3Cn, the Canadian "overfishing zone" (an experimental project). He noted that the substantial change in abundance of Pacific ocean perch, and other important rockfish species, in the Canadian zone was not reflected in the adjacent U.S. zone. He concluded that rockfish responded to fishing over very small spatial scales, and these differences were phenotypic rather than genotypic.

Withler *et al.* (2001) investigated the variation at five microsatellite loci of Pacific ocean perch sampled from 14 coastal sites—W. Vancouver Island, Goose Island Gully, "South" (51° 43.6-50.9') and "North" (52° 00.9 and 09.0') Moresby Gully⁷, West Queen Charlotte Islands, and Langara "Outside" and "Inside" (presumably west and east of Langara Point). They identified three genetically separate stocks—W. Vancouver Island, East QCI, and West QCI. East QCI includes Langara Outside, "North" Moresby Gully, and Goose Island Gully. West QCI includes Langara Inside, "South" Moresby Gully, and West Queen Charlotte Islands. Furthermore, they suggested that the heterogeneity reported by Seeb and Gunderson (1988) may indicate that: (1) both East and West QCI stocks are present in Mitchell's and Goose Island gullies; and (2) corroboration of the earlier results of Gunderson (1972). Neither study included depth as a variable.

Evidently, the intra-species relationships of Pacific ocean perch have not been adequately delineated to date. Phenotypic variations appear to be common, and, in some cases, narrowly applicable geographically. Genotypic variations remain to be firmly delineated.

⁶ ASP defines "prevalence" as the percentage of an animal group infected by a parasite species.

⁷ The latitude of Moresby Gully extends approximately from 51° 40' to 53° 10' N lat (Fig. 4).

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Table 1. List of published reports dealing with echo-sounder and/or on-bottom trawl surveys of the R/V *G.B. Reed* by year, month, ground and source, in the west Queen Charlotte Island (5E) and Hecate Strait–Queen Charlotte Sound (5C, 5B, and 5An) regions, 1966–78.

Year	Month	Ground ^a	Source
1966	Aug	GIG	Westrheim (1967a,b)
	Sep	LaS	
1967	Sep	GIG	Westrheim <i>et al.</i> (1968)
1969	Sep	GIG	Harling <i>et al.</i> (1969)
1970	May	LaS	Harling <i>et al.</i> (1970)
	Jun	GIG	
1971	Jun	GIG	Davenport <i>et al.</i> (1971)
	Aug	LaS/MiG	Westrheim <i>et al.</i> (1971)
	Oct	GIG	Harling <i>et al.</i> (1971)
1972	Jun	MiG/GIBS/GIG	Westrheim <i>et al.</i> (1972)
1973	Jun-Jul	MoG/GIBS	Westrheim <i>et al.</i> (1973)
	Sep	MiG/GIG	Harling <i>et al.</i> (1973)
1974	Jun	outer QCS ^b	Westrheim <i>et al.</i> (1974a)
	Sep	MoG	Westrheim <i>et al.</i> (1974b)
1976	Sep	MiG/GIG	Westrheim <i>et al.</i> (1976)
1977	Aug-Sep	MiG/GIG	Harling and Davenport (1977)
1978	Aug-Sep	MoG	Harling <i>et al.</i> (1978)

^a Ground: GIBS = Goose Island Bank Slope (5B); GIG = Goose Island Gully (5B + 5An); LaS = Langara Spit (MSA 1W, 5E); MiG = Mitchell's Gully (5B); MoG = Moresby Gully (5C+5B); QCS = Queen Charlotte Sound (5B+5An).

^b Cape St. James to Cape Scott, at 160 – 499 fms (293 – 913m).

Table 2. List of published reports, by year, month, vessel, location and source, dealing with on-bottom trawl surveys of Pacific ocean perch off British Columbia, 1978-97.

Year	Month	Vessel ^a	Location ^b	Source
1978	Jun-Jul	BW	WQCI	Nagtegaal <i>et al.</i> (1980)
	Sep	BW	NWVI	
	Jul-Aug	FP	DE/NWQCI/SEA	Shaw <i>et al.</i> (1978)
		HJ/ND	DE/NWQCI/SEA	Shaw (1978)
1979	May-Jun	BW	WQCI	Nagtegaal and Farlinger (1980a)
	Jul	BW	WQCI	Nagtegaal and Farlinger (1980b)
	Sep	SH/AH	MiG/GIG/NWQCI/SWVI	Lapi and Richards (1981)
1981	Jun	TN	MoG	Carter <i>et al.</i> (1982)
1983	Jul	GBR/FE#1	DE/GIG	Leaman and Nagtegaal (1983)
	Jul-Aug	FE#1	outer GIG ^c	Nagtegaal <i>et al.</i> (1985)
	Aug	OS		
1984	Aug-Sep	GBR/EH	GIG	Nagtegaal <i>et al.</i> (1986)
1985	Sep	HB	SWVI	Leaman <i>et al.</i> (1988)
1989	Jul	OS	WQCI/MoG/MiG/GIG/WVI	Gillespie and Leaman (1990)
1993	Jun	WER	NWQCI	Leaman <i>et al.</i> (1997a)
1994	Jun-Jul	OS/WER	GIG	Hand <i>et al.</i> (1995)
1995	Sep	OS/FR	GIG	Yamanaka <i>et al.</i> (1995)
1996	Jul	WER	NWQCI	Leaman <i>et al.</i> (1997b)
	Sep	CA	SWVI	Olsen <i>et al.</i> (1997)
1997	Sep	OS	WQCI	Workman <i>et al.</i> (1998)

^a Vessels: AH = F/V *Arctic Harvester*; BW = F/V *Blue Waters*; CA = F/V *Caledonian*; EH = F/V *Eastward Ho*; FE#1 = F/V *Free Enterprise No. 1*; FP = F/V *Freeport*; FR = F/V *Frosti*; GBR = R/V *G.B. Reed*; HJ = F/V *Heidi J*; HB = F/V *Howe Bay*; ND = F/V *Nore-Dick*; OS = F/V *Ocean Selector*; SH = F/V *Southward Ho*; TN = F/V *Tenacious*; WER = R/V *W.E. Ricker*.

^b Locations: DE = Dixon Entrance (MSA 1E, 5E); GIG = Goose Island Gully (5B+5An); MiG = Mitchell's Gully (5B); MoG = Moresby Gully (5C+5B); NWQCI = Northwest Queen Charlotte Islands (MSA 1W, 5E); NWVI = Northwest Vancouver Island (5As); SWVI = Southwest Vancouver Island (3Cn); WQCI = West Queen Charlotte Islands (5E); WVI = West Vancouver Island (3D).

^c Deeper than 165 fms (302 m).

Table 3. Area (sq nm) and percent deemed trawlable, by 20 fm depth interval, of Moresby (MoG), Mitchell's Gully (MiG), Southwest Slope Goose Island Bank (GIBS), and Goose Island Gully (GIG), surveyed by the R/V *G.B. Reed*, 1971-74.

Depth ^a		MoG ^b		MiG ^c		GIBS ^b		GIG ^d	
(m)	(fms)	Area	% trawl.	Area	% trawl.	Area	% trawl.	Area	% trawl.
165	90	537	21	...	...	95	4	353	E80
201	110	472	27	...	...	47	0	314	E91
238	130	516	32	140	75	74	5	165	E92
275	150	328	47	75	99	42	7	161	E100
311	170	115	58	85	99	18	6	...	...
348	190	131	45	65	98	19	5	...	...
384	210	95	52	...	...	...	...	...	...
421	230	38	61	...	...	...	...	...	...
458	250	7	0	...	...	...	...	...	...
Total		2239	34	365	90	295	4	993	E89

^a Mid-points of 20-fm depth intervals (90 = 80-119, etc.). Equivalent values in meters.

^b Westrheim (1974).

^c Westrheim (1972).

^d Gunderson *et al.* (1977). Area and percent trawlable adjusted for the removal of data for Southwest Slope Goose Island Bank, most of which had been assigned to Goose Island Gully in Westrheim (1972).

Table 4. Commercial landings (t), by 5-year period, region^a, and ground^b, of Pacific ocean perch, 1965-99. (Source: PBS Groundfish Data Base)

Period	WQCI				HSQCS					WVI			
	1W	2AW	2BW	Total	MoG	MiG	GIBS	GIG	Total	5As	3D	3Cn	Total
65-69	0.3	...	...	0.3	1	275	...	5572	5848	0	6	10	16.0
70-74	0	...	...	0	46	2169	...	5581	7796	0	47	510	557
75-79	243	2755	2113	5111	543	2260	...	4499	7302	0	51	150	201
80-84	2933	2488	1537	6958	7912	1440	525	2641	12518	35	857	1427	2319
85-89	8310	2309	1093	11712	5798	296	145	2184	8423	0	1917	616	2533
90-94	1200	1830	399	3429	5611	1328	180	3298	10417	290	2679	1772	4741
95-99	438	2993	226	3657	11989	1893	857	7467	22206	336	1593	1321	3250
Total	13124	12375	5368	30867	31900	9661	1707	31242	74510	661	7150	5806	13617
80-99	12881	9620	3255	25756	31310	4957	1707	15590	53564	661	7046	5136	12843
<u>At 80-99:</u>													
% within grounds	98.1	77.7	60.6	...	98.2	51.3	100.0	49.9	...	100.0	98.5	88.5	...
% among grounds	50.0	37.4	12.6	100.0	58.5	9.3	3.2	29.1	100.0	5.1	54.9	40.0	100.0

^a Region: HSQCI = Hecate Strait-Queen Charlotte Sound; WQCI = West Queen Charlotte Islands; and WVI = West Vancouver Island.

^b Ground: 1W = NW Queen Charlotte Islands (5E); 2AW = W. Queen Charlotte Islands (5E); 2BW = SW Queen Charlotte Islands (5E); MoG = Moresby Gully (5C+5B); MiG = Mitchell's Gully (5B); GIBS = Goose Island Bank Slope (5B); GIG = Goose Island Gully (5B+5An); 5As = NW Vancouver Island; 3D = W. Vancouver Island; 3Cn = SW Vancouver Island.

Table 5. Percentage of commercial landings (t) with known depth of catch, by 5-year period and area, for Pacific ocean perch in British Columbia, 1980-99 (Source: PBS Groundfish Data Base).

Period		5E	5C	5B	5A	3D	3Cn
1980-1984	Kno	5280	3717	9060	169	856	1430
	Unk	1678	2313	2418	196	352	306
	Total	6958	6030	11478	364	1208	1737
	% Kno	75.9	61.6	78.9	46.4	70.9	82.4
1985-1989	Kno	9530	1320	6237	941	1918	616
	Unk	2182	781	4260	1001	1989	348
	Total	11712	2101	10497	1942	3907	964
	% Kno	81.4	62.8	59.4	48.5	49.1	63.9
1990-1994	Kno	2564	1342	8019	1494	2677	1771
	Unk	865	221	3106	692	1414	363
	Total	3429	1563	11125	2186	4091	2153
	% Kno	74.8	85.9	72.1	68.3	65.4	82.2
1995-1999	Kno	3585	2423	13358	3745	1593	1339
	Unk	72	8	368	62	26	20
	Total	3657	2431	13726	3807	1618	1359
	% Kno	98.0	99.7	97.3	98.4	98.4	98.6
1980-1999	Kno	20959	8802	36674	6348	7045	5156
	Unk	4797	3323	10152	1951	3781	1056
	Total	25756	12125	46826	8299	10824	6212
	% Kno	81.4	72.6	78.3	76.5	65.1	83.0

Table 6. Evaluation of mean-length-at-age data, by location, vessel, and year, for Pacific ocean perch off British Columbia, 1966-99.

Location ^a	Vessel ^b	Year	Comments
1W (5E)	GBR	66,70,71	Limited data
	Other	80-99	One prominent nadir
2AW (5E)	GBR	nil	No data
	Other	80-99	Prominent nadirs
2BW (5E)	GBR	nil	No data
	Other	80-99	Limited data
MoG (5C+5B)	GBR	74	Prominent nadirs
	Other	80-99	Prominent nadirs
MiG (5B)	GBR	71-73,76,77	Limited data
	Other	80-99	Limited data
GIBS (5B)	GBR	nil	No data
	Other	80-99	No data
GIG (5B+5An)	GBR	66,67,69-73,76,77	No prominent nadirs
	Other	80-99	Prominent nadirs
5As	GBR	nil	No data
	Other	80-99	No data
3D	GBR	nil	No data
	Other	80-99	Limited data
3Cn	GBR	nil	No data
	Other	80-99	Limited data

^a Locations: Area 3D; Sub-areas 3Cn, 5An, 5As; MSAs 1W, 2AW, 2BW, GIBS = Goose Island Bank Slope, GIG = Goose Island Gully, MiG = Mitchell's Gully, MoG = Moresby Gully.

^b Vessels: GBR = *G.B. Reed*; Other = chartered commercial, and commercial.

Table 7. Summary, by quarter year, of commercial landings, depths of capture, and numbers of otoliths read for selected age groups (10-20), of Pacific ocean perch caught by "other vessels", in MSAs 1W and 2AW, 1980-99 (Source: Appendix tables 1-6).

		Quarter year				Total
		I	II	III	IV	
<u>MSA 1W</u>						
Landings	(t)	1588	6932	1258	1568	11346
	(%)	14.0	61.1	11.1	13.8	100.0
Depth ^a	(m)	325	310	292	298	
	(fms)	178	169	160	163	
S.D.	(m)	71	44	41	53	
Otoliths	M	179	368	668	217	1432
	F	175	429	545	281	1430
	T	354	797	1213	498	2862
	(%)	12.4	27.8	42.4	17.4	100.0
<u>MSA 2AW</u>						
Landings	(t)	2891	1627	1096	1526	7140
	(%)	40.5	22.8	15.4	21.4	100.0
Depth ^a	(m)	337	313	288	302	
	(fms)	184	171	157	165	
S.D.	(m)	57	57	43	53	
Otoliths	M	220	96	44	54	414
	F	278	181	67	66	592
	T	498	277	111	120	1006
	(%)	49.5	27.5	11.0	11.9	100.0

^a Mean. Weighted to landings among 40-m depth intervals. Equivalent values in fathoms.

Table 8. Commercial landings (t), by depth, of Pacific ocean perch by "other vessels", from MSAs 1W and 2AW (5E), during Quarters I+IV and II+III, 1980-99 (Source: Appendix tables 1 and 4).

Depth ^a		1W				2AW			
		I+IV		II+III		I+IV		II+III	
(fms)	(m)	(t)	(%)	(t)	(%)	(t)	(%)	(t)	(%)
77	140	...	...	...	...	2	0.0	...	...
98	180	...	...	4	0.0	15	0.3	4	0.1
120	220	86	2.7	174	2.1	374	8.5	350	12.9
142	260	<u>1133</u>	35.9	1939	23.7	412	9.3	500	18.4
164	300	884	28.0	<u>3615</u>	44.1	1155	26.1	<u>941</u>	34.6
186	340	479	15.2	1658	20.2	<u>1583</u>	35.8	631	23.2
208	380	252	8.0	404	4.9	508	11.5	154	5.7
230	420	224	7.1	345	4.2	235	5.3	119	4.4
251	460	28	0.9	15	0.2	80	1.8	14	0.5
273	500	34	1.1	32	0.4	8	0.2	8	0.3
295	540	12	0.4	6	0.1	42	1.0	1	0.0
317	580	2	0.1	...	...	2	0.0	0.2	0.0
339	620	18	0.6	...	...	0.4	0.0	0	0
361	660	0	0	...	...	0	0	1	0.0
383	700	3	0.1	...	...	0.1	0.0	...	...
Total	(t)	3156	100.0	8192	100.0	4417	100.0	2723	100.0
Mean	(m)	311		307		325		303	
	(fms)	170		168		177		166	
S.D.	(m)	64		44		58		53	
220-420	(t)	3058		8135		4267		2695	
	(%)	96.9		99.3		96.6		99.0	

^a Mid-points of 40-m depth intervals (180 = 160-199, etc.). Equivalent values in fathoms.

Table 9. Mean lengths^a (mm) and numbers of specimens (N), by selected depths (220-420 m) and age groups (10-20), for male Pacific ocean perch landed by "other vessels", from MSAs 1W (April-September) and 2AW (January-December) (5E), 1980-99 (Source: Appendix tables 2 and 5).

Depth ^b		10				12				14			
		1W		2AW		1W		2AW		1W		2AW	
(fms)	(m)	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
120	220	359	27	364	5	373	21	401	8	381	9	385	2
142	260	362	92	370	4	370	76	391	8	381	35	394	8
164	300	354	144	367	12	369	134	378	31	378	31	396	8
186	340	360	51	356	46	370	22	367	58	385	21	382	19
208	380	356	43	357	48	370	9	378	42	387	11	384	18
230	420	356	7	338	5	385	15	357	3	393	3	383	3
Total		364		120		277		150		110		58	
		16				18				20			
120	220	394	5	403	4	394	5	400	2	431	14	...	0
142	260	392	9	405	10	392	24	405	2	392	44	...	0
164	300	393	7	394	14	393	12	398	9	393	27	387	3
186	340	391	5	387	11	391	5	398	7	388	7	...	0
208	380	385	6	389	10	385	6	380	2	393	5	...	0
230	420	...	0	...	0	375	2	...	0	410	2	...	0
Total		32		49		54		22		99		3	

^a Weighted to numbers of specimens.

^b Mid-points of 40-m depth intervals (220 = 200-239, etc.). Equivalent values in fathoms.

Table 10. Mean lengths^a (mm) and numbers of specimens (N), by selected depths (220-420 m) and age groups (10-20), for female Pacific ocean perch landed by "other vessels", from MSAs 1W (April-September) and 2AW (January-December) (5E), 1980-99 (Source: Appendix tables 3 and 6).

Depth ^b		10				12				14			
(fms)	(m)	1W		2AW		1W		2AW		1W		2AW	
		(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
120	220	370	20	380	9	384	22	409	13	403	13	426	5
142	260	371	58	...	0	387	80	414	16	404	32	407	7
164	300	363	163	372	18	381	157	391	42	399	49	397	20
186	340	367	65	368	61	380	18	384	124	406	22	402	33
208	380	374	65	371	61	383	3	384	44	395	2	404	21
230	420	352	68	369	8	398	6	370	2	395	2	408	5
Total		439		157		286		241		120		91	
		16				18				20			
120	220	407	28	445	6	...	0	423	3	424	14	...	0
142	260	412	41	449	10	422	7	nil	0	434	25	446	2
164	300	407	24	413	32	423	14	430	6	424	18	424	11
186	340	419	11	411	12	434	4	424	8	437	4	...	0
208	380	384	8	423	10	...	0	453	3	429	7	...	0
230	420	...	0	...	0	...	0	...	0	...	0	...	0
Total		112		70		25		20		68		13	

^a Weighted to numbers of specimens.

^b Mid-points of 40-m depth intervals (220 = 200-239, etc.). Equivalent values in fathoms.

Table 11. Relationships of mean lengths with depth, by MSA and age group, for male and female Pacific ocean perch landed by "other vessels", from MSAs 1W and 2AW (5E), 1980-99 (Source: Tables 8 and 9). N.B. Excluding age groups with fewer than four depth intervals represented.

Age (y)	Males				Females			
	D-S ^a (mm)	N ^b	Nadir ^c (m)	Dn-S ^d (mm)	D-S ^a (mm)	N ^b	Nadir ^c (m)	Dn-S ^d (mm)
<u>MSA 1W (Apr-Sep)</u>								
10	-3	6	300	-5	-18	6	300	-8
12	+12	6	300	-4	+14	5	none	-6
14	+6	5	300	-3	+3	4	300	-4
16	-9	5	260	-2	-23	5	300	0
18	-9	5	260	-2	nil	3	nil	...
20	-38	5	340	-43	+5	4	300	0
<u>MSA 2AW (Jan-Dec)</u>								
10	-26	5	none	...	-11	5	340	-12
12	-23	5	340	-34	-25	5	none	...
14	-10	4	340	-3	-18	6	300	-29
16	-16	4	340	-18	-22	5	340	-34
18	nil	2	nil	...	nil	2	nil	...
20	nil	1	nil	...	nil	1	nil	...

^a D-S = difference between mean lengths at the deepest (D) and shallowest (S) 40-m depth interval.

^b N = Number of 40-m depth intervals, in which the mean length is based on at least 5 specimens.

^c Single nadir, if present, among 40-m depth intervals.

^d Dn-S = difference between mean length at nadir (Dn) and at shallowest (S) 40-m depth interval.

Table 12. *G.B. Reed* mean catch rates (nos/h, 1974) and commercial landings (t; 1980-99), by depth, for Pacific ocean perch from Moresby Gully (5C+5B) (Sources listed below).

<i>G.B. Reed</i> ^a				Commercial landings ^b			
Depth ^c		Nos/h ^d	Hauls	Depth ^c		(t)	%
(m)	(fms)			(fms)	(m)		
...	...	...	...	11	20	1	0.0
...	...	...	...	33	60	11	0.1
...	...	...	...	55	100	80	0.4
...	...	...	...	77	140	980	4.5
165	90	562	18	98	180	1496	6.9
201	110	2291	8	120	220	3579	16.5
238	130	1583	6	142	260	7241	33.5
275	150	1027	6	164	300	5873	27.1
311	170	587	4	186	340	1856	8.6
348	190	609	2	208	380	456	2.1
384	210	104	1	230	420	44	0.2
421	230	48	1	251	460	8	0.0
...	...	...	...	273	500	2	0.0
...	...	...	...	295	540	6	0.0
...	...	...	...	317	580	0.02	0.0
Total			46			21633	100.0
				180-340		19049	88.1

^a Appendix table 7, September 1974.

^b Appendix table 8, April-September 1980-89.

^c Mid-points of 20-fm intervals (90 = 80-99, etc.). Equivalent values in meters.

^d Weighted to numbers of hauls.

^e Mid-points of 40-m depth intervals (20 = 0-39, etc.). Equivalent values in fathoms.

Table 13. Mean lengths (mm) and numbers of specimens (N), by depth interval and age group, of male Pacific ocean perch caught by the R/V *G.B. Reed* (September 1974), and "other vessels" (April-September 1980-99), in Moresby Gully (5C+5B) (Sources: GBR from PBS Scientific Archive DN/2/13; "Other" from Appendix table 9).

10								12							
Depth ^a		GBR		Depth ^b		Other		Depth ^a		GBR		Depth ^b		Other	
(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N	(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N
...	...	...	...	98	180	348	3	...	...	...	...	98	180	375	2
201	110	346	32	120	220	353	10	201	110	379	31	120	220	375	4
238	130	319	16	142	260	351	14	238	130	362	17	142	260	376	16
275	150	336	9	164	300	347	12	275	150	350	16	164	300	381	8
311	170	312	3	186	340	...	0	311	170	349	7	186	340	375	15
348	190	...	0	208	380	320	3	348	190	...	0	208	380	360	3
...	...	...	...	230	420	357	22	...	...	...	...	230	420	380	19
...	...	...	...	251	460	357	30	...	...	...	...	251	460	374	6
...	...	...	...	273	500	356	10	...	...	...	...	273	500	377	23
...	...	...	...	295	540	349	10	...	...	...	...	295	540	377	58
...	...	...	...	317	580	354	45	...	...	...	...	317	580	375	4
Total		60				159				71				158	
14								16							
...	...	...	...	98	180	...	0	...	...	...	...	98	180	...	0
201	110	394	8	120	220	387	15	201	110	410	19	120	220	377	3
238	130	385	4	142	260	381	6	238	130	400	15	142	260	405	2
275	150	367	16	164	300	390	15	275	150	391	9	164	300	402	11
311	170	366	13	186	340	355	2	311	170	378	9	186	340	363	3
348	190	370	6	208	380	370	2	348	190	365	3	208	380	...	0
...	...	...	...	230	420	396	7	...	...	...	...	230	420	404	8
...	...	...	...	251	460	383	3	...	...	...	...	251	460	390	11
...	...	...	...	273	500	387	24	...	...	...	...	273	500	394	34
...	...	...	...	295	540	...	0	...	...	...	...	295	540	389	6
...	...	...	...	317	580	390	4	...	...	...	...	317	580	398	5
Total		47				78				55				83	

^a Mid-points of 20-fm depth intervals (110 = 100-119, etc.). Equivalent values in meters.

^b Mid-points of 40-m depth intervals (180 = 160-199, etc.). Equivalent values in fathoms.

Table 13 cont'd. Mean lengths (mm) and numbers of specimens (N), by depth interval and age group, of male Pacific ocean perch caught by the R/V *G.B. Reed* (September 1974), and "other vessels" (April-September 1980-99), in Moresby Gully (5C+5B) (Sources: GBR from PBS Scientific Archive DN/2/13; "Other" from Appendix table 9).

18								20							
Depth ^a		GBR		Depth ^b		Other		Depth ^a		GBR		Depth ^b		Other	
(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N	(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N
...	...			98	180	385	2	...	...	...	...	98	180	...	0
201	110	412	26	120	220	395	2	201	110	419	18	120	220	430	4
238	130	414	21	142	260	394	5	238	130	417	12	142	260	394	6
275	150	396	13	164	300	418	8	275	150	398	15	164	300	398	12
311	170	388	24	186	340	384	5	311	170	397	31	186	340	...	0
348	190	394	10	208	380	400	3	348	190	397	17	208	380	...	0
...	...	...	...	230	420	407	18	...	...	...	...	230	420	406	10
...	...	...	...	251	460	...	0	...	...	...	...	251	460	...	0
...	...	...	...	273	500	397	17	...	...	...	...	273	500	405	17
...	...	...	...	295	540	392	6	...	...	...	...	295	540	407	3
...	...	...	...	317	580	390	8	...	...	...	...	317	580	...	0
Total		94				74				93				52	

^a Mid-points of 20-fm depth intervals (110 = 100-119, etc.). Equivalent values in meters.

^b Mid-points of 40-m depth intervals (180 = 160-199, etc.). Equivalent values in fathoms.

Table 14. Mean lengths (mm) and numbers of specimens (N), by depth interval and age group, of female Pacific ocean perch caught by the R/V *G.B. Reed* (September 1974), and "other vessels" (April-September 1980-99), in Moresby Gully (5C+5B) (Sources: GBR from PBS Scientific Archive DN/2/13; "other" from Appendix table 10).

10								12							
Depth ^a		GBR		Depth ^b		Other		Depth ^a		GBR		Depth ^b		Other	
(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N	(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N
...	...	...	...	98	180	...	0	...	...	...	...	98	180	360	4
201	110	341	16	120	220	...	0	201	110	379	24	120	220	379	7
238	130	321	11	142	260	360	9	238	130	364	11	142	260	383	15
275	150	327	13	164	300	366	5	275	150	352	11	164	300	383	3
311	170	325	3	186	340	341	5	311	170	350	4	186	340	391	10
348	190	...	0	208	380	...	0	348	190	...	0	208	380	395	2
384	210	...	0	230	420	371	20	384	210	...	0	230	420	403	10
...	...	...	...	251	460	366	26	...	...	...	...	251	460	394	8
...	...	...	...	273	500	388	6	...	...	...	...	273	500	388	32
...	...	...	...	295	540	354	19	...	...	...	...	295	540	393	99
...	...	...	...	317	580	382	26	...	...	...	...	317	580	396	8
Total		43				116				50				198	
14								16							
...	...	...	...	98	180	410	2	...	...	...	...	98	180	...	0
201	110	407	5	120	220	420	2	201	110	nil	0	120	220	407	2
238	130	395	2	142	260	410	9	238	130	429	8	142	260	417	12
275	150	...	0	164	300	382	5	275	150	405	2	164	300	425	4
311	170	371	5	186	340	390	2	311	170	408	12	186	340	385	2
348	190	...	0	208	380	...	0	348	190	375	3	208	380	415	2
384	210	...	0	230	420	...	0	384	210	395	2	230	420	428	11
...	...	...	...	251	460	...	0	...	...	...	...	251	460	428	6
...	...	...	...	273	500	403	21	...	...	...	...	273	500	421	34
...	...	...	...	295	540	395	9	...	...	...	...	295	540	408	12
...	...	...	...	317	580	402	12	...	...	...	...	317	580	400	12
Total		12				62				27				97	

^a Mid-points of 20-fm depth intervals (110 = 100-119, etc.). Equivalent values in meters.

^b Mid-points of 40-m depth intervals (180 = 160-199, etc.). Equivalent values in fathoms.

Table 14 cont'd. Mean lengths (mm) and numbers of specimens (N), by depth interval and age group, of female Pacific ocean perch caught by the R/V *G.B. Reed* (September 1974), and "other vessels" (April-September 1980-99), in Moresby Gully (5C+5B) (Sources: GBR from PBS Scientific Archive DN/2/13; "other" from Appendix table 10).

18								20							
Depth ^a		GBR		Depth ^b		Other		Depth ^a		GBR		Depth ^b		Other	
(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N	(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N
...	...	...	...	98	180	...	0	...	...	...	...	98	180	...	0
201	110	...	0	120	220	436	5	201	110	nil	0	120	220	440	6
238	130	441	19	142	260	427	5	238	130	444	28	142	260	430	4
275	150	431	10	164	300	424	8	275	150	442	10	164	300	440	7
311	170	407	9	186	340	...	0	311	170	422	7	186	340	...	0
348	190	400	8	208	380	438	9	348	190	409	8	208	380	...	0
384	210	403	5	230	420	433	10	384	210	413	8	230	420	424	11
...	...	...	...	251	460	410	3	...	...	...	...	251	460	nil	0
...	...	...	...	273	500	419	21	...	...	...	...	273	500	421	21
...	...	...	...	295	540	395	4	...	...	...	...	295	540	419	12
...	...	...	...	317	580	...	0	...	...	...	...	317	580	425	12
Total		51				65				61				73	

^a Mid-points of 20-fm depth intervals (110 = 100-119, etc.). Equivalent values in meters.

^b Mid-points of 40-m depth intervals (180 = 160-199, etc.). Equivalent values in fathoms.

Table 15. Relationships of mean lengths with depth, by age, for male and female Pacific ocean perch caught by the R/V *G.B. Reed* (September 1974), and "other vessels" (April-September 1980-99) in Moresby Gully (5C+5B) (Sources: Tables 13 and 14).

Age (y)	<i>G.B. Reed</i> (5C)					Other Vessels (5C+5B)			
	D-S ^a (mm)	N ^b	Nadir ^c (fms) (m)	Dn-S ^d (mm)		D-S ^a (mm)	N ^b	Nadir ^c (m)	Dn-S ^d (mm)
Male									
10	nil	3	nil	nil	...	+1	8	300	-6
12	-30	4	none	none	...	-1	7	460	-2
14	-24	4	170	311	-28	0	5	none	...
16	-32	4	none	none	...	-4	6	460	-12
18	-18	5	170	311	-24	-4	7	340	-10
20	-22	5	none	none	...	+11	4	none	...
Female									
10	nil	3	nil	nil	...	+22	8	340	-19
12	nil	3	nil	nil	...	+19	8	500	+9
14	nil	2	nil	nil	...	-8	5	300	-28
16	nil	2	nil	nil	...	-17	6	none	...
18	-38	5	190	348	-41	-17	6	300	-12
20	-31	5	190	348	-35	-15	6	540	-21

^a D-S = difference between mean lengths at the deepest (D) and shallowest (S) 40-m depth interval.

^b N = Number of 40-m depth intervals, in which the mean length is based on at least 5 specimens.

^c Single nadir, if present, among 40-m depth intervals.

^d Dn-S = difference between mean length at nadir (Dn) and at shallowest (S) 40-m depth interval.

Table 16. Summary, by quarter year, of commercial landings, depths of capture, and numbers of otoliths read for selected age groups (10-20), for Pacific ocean perch caught by "other vessels", in Moresby and Goose Island gullies, 1980-99) (Source: Appendix tables 8-15).

		Quarter year				Total
		I	II	III	IV	
<u>Moresby Gully</u>						
Landings	(t)	3383	14850	6785	6295	31313
	(%)	10.8	47.4	21.7	20.1	100.0
Depth ^a	(m)	294	279	227	258	
	(fms)	161	152	124	141	
S.D.	(m)	39	43	57	37	
Otoliths	M	170	459	158	140	927
	F	263	451	162	158	1034
	T	433	910	320	298	1961
	(%)	22.1	46.4	16.3	15.2	100.0
<u>Goose Island Gully</u>						
Landings	(t)	619	8079	5032	1860	15590
	(%)	4.0	51.8	32.3	11.9	100.0
Depth ^a	(m)	219	212	200	228	
	(fms)	120	116	109	125	
S.D.	(m)	54	47	43	44	
Otoliths	M	14	490	475	51	1030
	F	12	483	478	66	1039
	T	26	973	953	117	2069
	(%)	1.3	47.0	46.1	5.7	100.0

^a Mean. Weighted to landings among 40-m depth intervals. Equivalent values in fathoms.

Table 17. *G.B. Reed* mean catch rates (nos/h; June-September 1966-76), and commercial landings (t) April-September 1980-99), by depth, for Pacific ocean perch from Goose Island Gully (5B+5An) (Sources listed below.)

<i>G.B. Reed</i> ^a				Commercial landings ^b			
Depth ^c		Nos/h ^d	Hauls	Depth ^c		(t)	%
(m)	(fms)			(fms)	(m)		
...	...	...	...	11	20	1	0.0
...	...	...	...	33	60	14	0.1
...	...	...	...	55	100	160	1.2
128	70	1580	2	77	140	846	6.5
165	90	1345	43	98	180	4984	38.0
201	110	1931	81	120	220	5319	40.6
238	130	2192	49	142	260	1128	8.6
275	150	2498	41	164	300	294	2.2
...	...	...	...	186	340	177	1.4
...	...	...	...	208	380	119	0.9
...	...	...	...	230	420	44	0.3
...	...	...	...	251	460	7	0.1
...	...	...	...	273	500	9	0.1
...	...	...	...	295	540	4	0.0
...	...	...	...	317	580	1	0.0
...	...	...	...	339	620	3	0.0
...	...	...	...	361	660	1	0.0
Total			216			13111	100.0
140-260						12277	93.6

^a June-September. Appendix table 7.

^b April-September. Appendix table 11.

^c Mid-points of 20-fm intervals (70 = 60-79, etc.). Equivalent values in meters.

^d Weighted to numbers of hauls.

^e Mid-points of 40-m depth intervals (20 = 0-39, etc.). Equivalent values in fathoms.

Table 18. Mean lengths (mm) and numbers of specimens (N), by depth interval and age group, of male Pacific ocean perch caught by the R/V *G.B. Reed* (June-September 1966-76), and "other vessels" (April-September 1980-99), in Goose Island Gully (5B+5An) (Source: Appendix tables 12 and 14).

10								12							
Depth ^a		GBR		Depth ^b		Other		Depth ^a		GBR		Depth ^b		Other	
(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N	(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N
...	...	...	...	55	100	...	0	...	...	...	...	55	100	358	4
...	...	...	...	77	140	...	0	...	...	...	...	77	140	371	11
165	90	328	128	98	180	368	83	165	90	356	70	98	180	371	61
201	110	335	171	120	220	362	74	201	110	361	161	120	220	369	89
238	130	334	67	142	260	349	16	238	130	363	106	142	260	365	7
275	150	331	85	164	300	353	4	275	150	358	119	164	300	369	4
...	...	...	...	186	340	346	4	...	...	...	...	186	340	...	0
...	...	...	...	208	380	347	3	...	...	...	...	208	380	363	15
...	...	...	...	230	420	338	3	...	...	...	...	230	420	361	6
...	...	...	...	251	460	...	0	...	...	...	...	251	460	...	0
...	...	...	...	273	500	351	8	...	...	...	...	273	500	351	8
Total		451				195				456				205	

14								16							
...	...	...	...	55	100	...	0	...	...	...	...	55	100	373	3
...	...	...	...	77	140	382	7	...	...	...	...	77	140	394	9
165	90	377	63	98	180	382	56	165	90	393	41	98	180	387	39
201	110	375	213	120	220	380	74	201	110	393	145	120	220	389	57
238	130	377	161	142	260	370	8	238	130	390	132	142	260	377	12
275	150	371	167	164	300	369	7	275	150	381	139	164	300	...	0
...	...	...	...	186	340	384	3	...	...	...	...	186	340	...	0
...	...	...	...	208	380	371	5	...	...	...	...	208	380	374	2
...	...	...	...	230	420	369	12	...	...	...	...	230	420	...	0
...	...	...	...	251	460	359	3	...	...	...	...	251	460	...	0
...	...	...	...	273	500	333	6	...	...	...	...	273	500	...	0
Total		604				181				457				122	

^a Mid-points of 20-fm depth intervals (90 = 80-99, etc.). Equivalent values in meters.

^b Mid-points of 40-m depth intervals (100 = 80-119, etc.). Equivalent values in fathoms.

Table 18 cont'd. Mean lengths (mm) and numbers of specimens (N), by depth interval and age group, of male Pacific ocean perch caught by the R/V *G.B. Reed* (June-September 1966-76), and "other vessels" (April-September 1980-99), in Goose Island Gully (5B+5An) (Source: Appendix tables 12 and 14).

18								20							
Depth ^a		GBR		Depth ^b		Other		Depth ^a		GBR		Depth ^b		Other	
(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N	(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N
...	...	...	...	55	100	...	0	...	...	...	...	55	100	...	0
...	...	...	...	77	140	416	2	...	...	...	...	77	140	400	9
165	90	403	28	98	180	394	50	165	90	414	8	98	180	402	36
201	110	407	104	120	220	391	74	201	110	412	68	120	220	396	34
238	130	403	91	142	260	376	7	238	130	409	45	142	260	395	6
275	150	394	114	164	300	404	6	275	150	398	70	164	300	404	2
...	...	...	...	186	340	397	4	...	...	...	...	186	340	...	0
...	...	...	...	208	380	387	15	...	...	...	...	208	380	...	0
...	...	...	...	230	420	385	12	...	...	...	...	230	420	...	0
...	...	...	...	251	460	386	2	...	...	...	...	251	460	...	0
...	...	...	...	273	500	373	6	...	...	...	...	273	500	...	0
Total			337				178				191				87

^a Mid-points of 20-fm depth intervals (90 = 80-99, etc.). Equivalent values in meters.

^b Mid-points of 40-m depth intervals (100 = 80-119, etc.). Equivalent values in fathoms.

Table 19. Mean lengths (mm) and numbers of specimens (N), by depth interval and age group, of female Pacific ocean perch caught by the R/V *G.B. Reed* (June-September 1966-76), and "other vessels" (April-September 1980-99), in Goose Island Gully (5B+5An) (Source: Appendix tables 13 and 15).

10								12							
Depth ^a		GBR		Depth ^b		Other		Depth ^a		GBR		Depth ^b		Other	
(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N	(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N
...	...	...	...	55	100	...	0	...	...	...	...	55	100	...	0
...	...	...	...	77	140	...	0	...	...	...	...	77	140	388	4
165	90	335	173	98	180	372	78	165	90	358	59	98	180	383	5
201	110	340	132	120	220	373	79	201	110	370	133	120	220	386	77
238	130	339	162	142	260	369	11	238	130	371	84	142	260	384	7
275	150	333	64	164	300	346	3	275	150	369	89	164	300	399	8
...	...	...	...	186	340	350	6	...	...	...	...	186	340	378	2
...	...	...	...	208	380	352	11	...	...	...	...	208	380	382	5
...	...	...	...	230	420	342	11	...	...	...	...	230	420	361	7
...	...	...	...	251	460	342	3	...	...	...	...	251	460	...	0
...	...	...	...	273	500	348	8	...	...	...	...	273	500	352	13
...	...	...	...	295	540	...	0	...	...	...	...	295	540	364	2
Total		531				210				365				176	
14								16							
...	...	...	...	55	100	...	0	...	...	...	...	55	100	403	3
...	...	...	...	77	140	...	0	...	...	...	...	77	140	419	7
165	90	381	75	98	180	400	31	165	90	412	32	98	180	413	52
201	110	388	156	120	220	395	75	201	110	416	157	120	220	413	65
238	130	391	135	142	260	391	27	238	130	410	137	142	260	393	12
275	150	387	105	164	300	387	8	275	150	402	98	164	300	399	2
...	...	...	...	186	340	397	12	...	...	...	...	186	340	nil	0
...	...	...	...	208	380	394	9	...	...	...	...	208	380	...	0
...	...	...	...	230	420	379	12	...	...	...	...	230	420	402	3
...	...	...	...	251	460	400	3	...	...	...	...	251	460	...	0
...	...	...	...	273	500	374	11	...	...	...	...	273	500	420	5
...	...	...	...	295	540	...	0	...	...	...	...	295	540	...	0
Total		471				188				424				149	

^a Mid-points of 20-fm depth intervals (90 = 80-99, etc.). Equivalent values in meters.

^b Mid-points of 40-m depth intervals (100 = 80-119, etc.). Equivalent values in fathoms.

Table 19 cont'd. Mean lengths (mm) and numbers of specimens (N), by depth interval and age group, of female Pacific ocean perch caught by the R/V *G.B. Reed* (June-September 1966-76), and "other vessels" (April-September 1980-99), in Goose Island Gully (5B+5An) (Source: Appendix tables 13 and 15).

18								20							
Depth ^a		GBR		Depth ^b		Other		Depth ^a		GBR		Depth ^b		Other	
(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N	(m)	(fms)	(mm)	N	(fms)	(m)	(mm)	N
...	...	...	...	55	100	...	0	...	...	...	...	55	100	nil	0
...	...	...	...	77	140	410	2	...	...	...	...	77	140	438	9
165	90	432	13	98	180	420	39	165	90	438	16	98	180	429	12
201	110	430	119	120	220	420	46	201	110	442	95	120	220	425	38
238	130	425	123	142	260	413	18	238	130	436	86	142	260	430	5
275	150	422	91	164	300	419	5	275	150	428	61	164	300	...	0
...	...	...	...	186	340	422	12	...	...	...	...	186	340	...	0
...	...	...	...	208	380	417	20	...	...	...	...	208	380	435	3
...	...	...	...	230	420	417	13	...	...	...	...	230	420	...	0
...	...	...	...	251	460	424	3	...	...	...	...	251	460	...	0
...	...	...	...	273	500	413	9	...	...	...	...	273	500	...	0
...	...	...	...	295	540	...	0	...	...	...	...	295	540	...	0
Total		346				167				258				67	

^a Mid-points of 20-fm depth intervals (90 = 80-99, etc.). Equivalent values in meters.

^b Mid-points of 40-m depth intervals (100 = 80-119, etc.). Equivalent values in fathoms.

Table 20. Relationships of mean lengths with depth, by age group, for male and female Pacific ocean perch caught by the R/V *G.B. Reed* (June-September 1966-76), and "other vessels" (April-September 1980-99), in Goose Island Gully (5B+5An) (Sources: Tables 18 and 19).

Age (y)	<i>G.B. Reed</i>					Other Vessels			
	D-S ^a (mm)	N ^b	Nadir ^c (fms) (m)		Dn-S ^d (mm)	D-S ^a (mm)	N ^b	Nadir ^c (m)	Dn-S ^d (mm)
Male									
10	+3	4	none	...	...	-17	4	none	...
12	+2	4	none	...	...	-20	7	none	...
14	-6	4	110	201	-2	-49	8	300	-13
16	-12	4	none	...	...	-17	4	180	-7
18	-9	4	none	...	...	-21	7	260	-18
20	-16	4	none	...	...	-5	4	none	...
Female									
10	-2	4	none	...	...	-24	7	340	-22
12	+11	4	none	...	...	-31	7	260	+1
14	+6	4	none	...	...	-26	8	300	-13
16	-10	4	none	...	...	+1	5	260	-6
18	-10	4	none	...	...	-7	8	260	-7
20	-10	4	none	...	...	-8	4	220	-13

^a D-S = difference between mean lengths at the deepest (D) and shallowest (S) 40-m depth interval.

^b N = Number of 40-m depth intervals, in which the mean length is based on at least 5 specimens.

^c Single nadir, if present, among 40-m depth intervals.

^d Dn-S = difference between mean length at nadir (Dn) and at shallowest (S) 40-m depth interval.

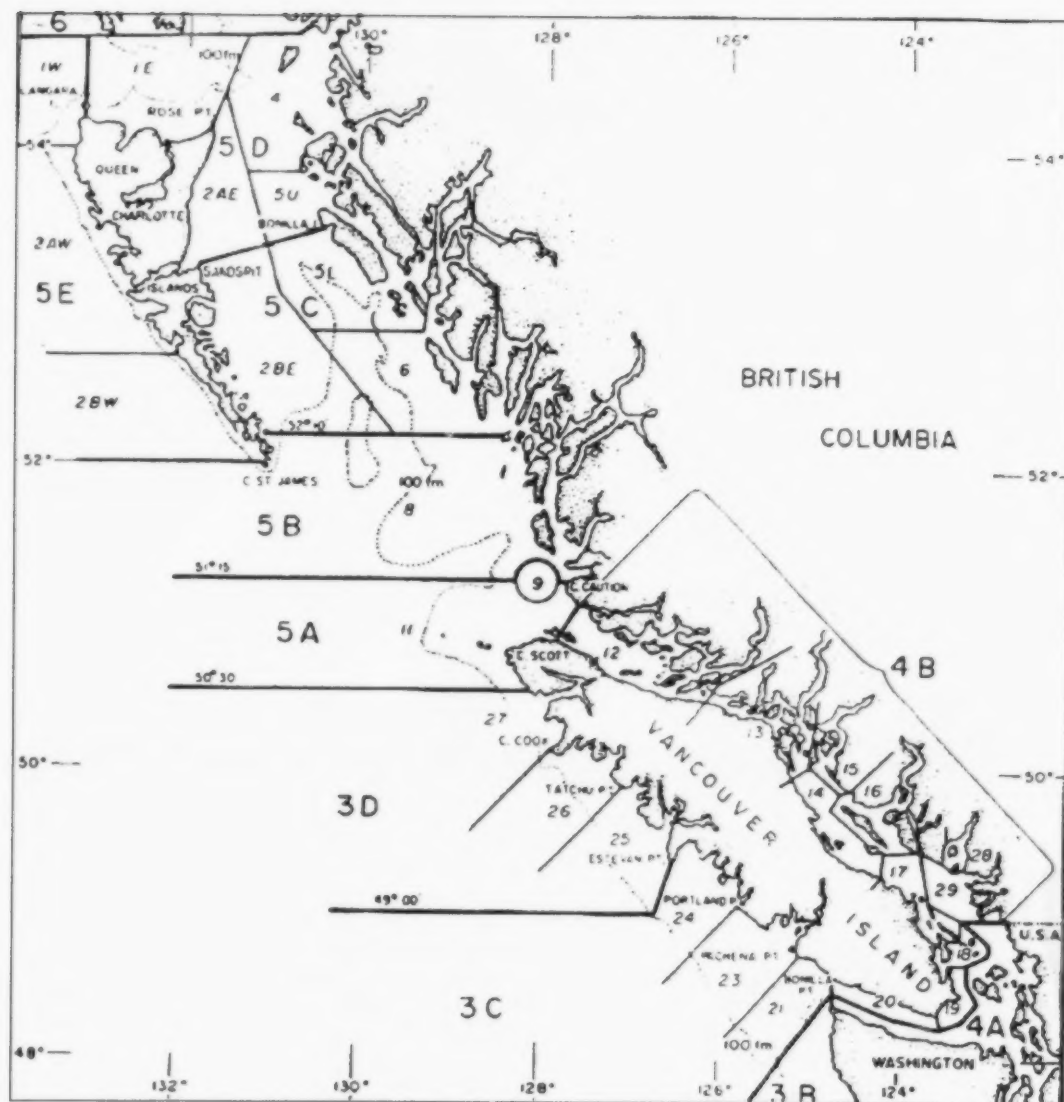


Fig. 1. Groundfish statistical areas off British Columbia.

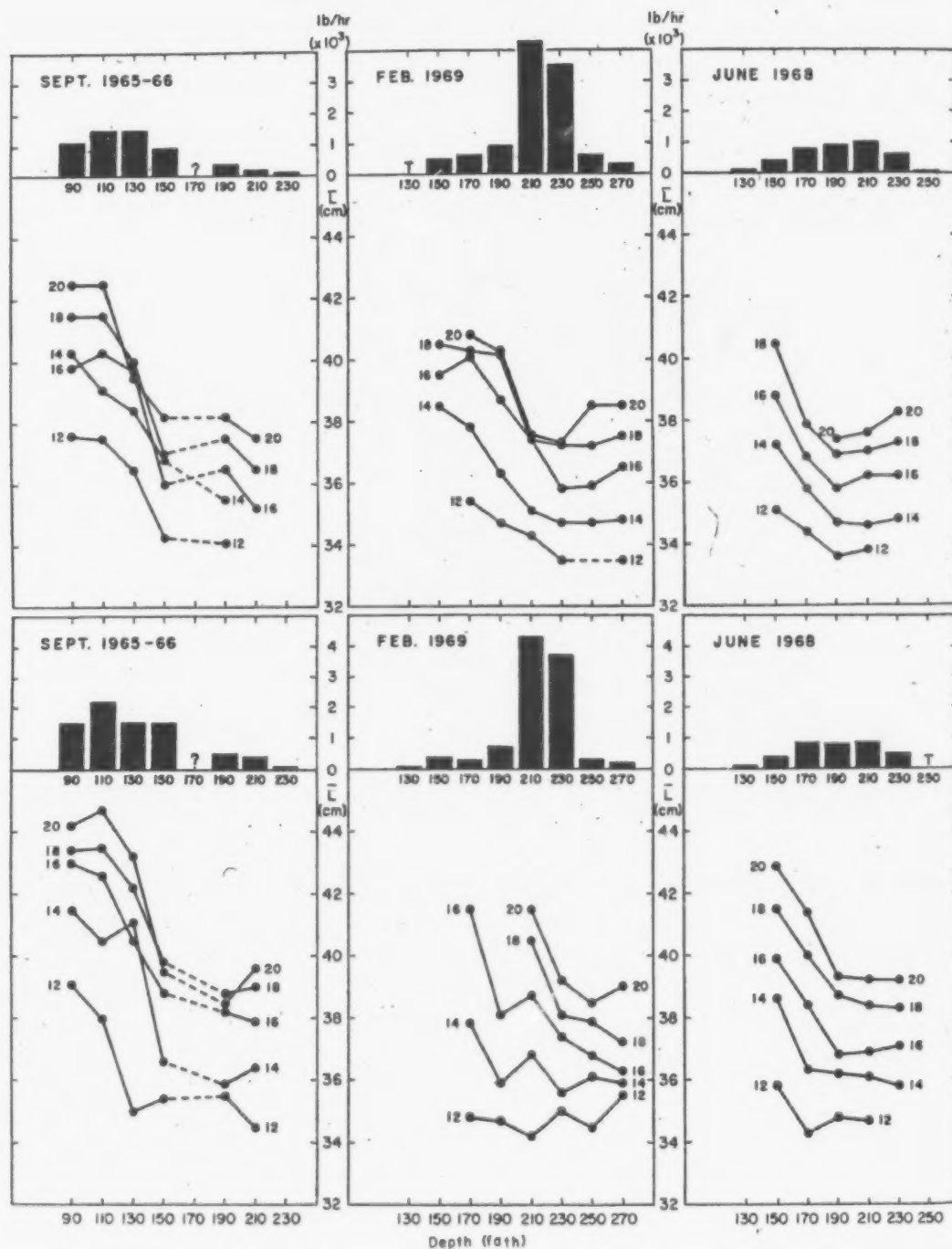


Fig. 2. Mean lengths (cm) of selected age groups, and *G.B. Reed* catch rates (no./hr), by 20-fath depth interval for male (upper) and female (lower) Pacific ocean perch off SW Vancouver Island in September 1965-66, February 1969, and June 1968. (Solid dots indicate means based on fewer than 5 fish.) (from Westheim (1973), Fig. 6).

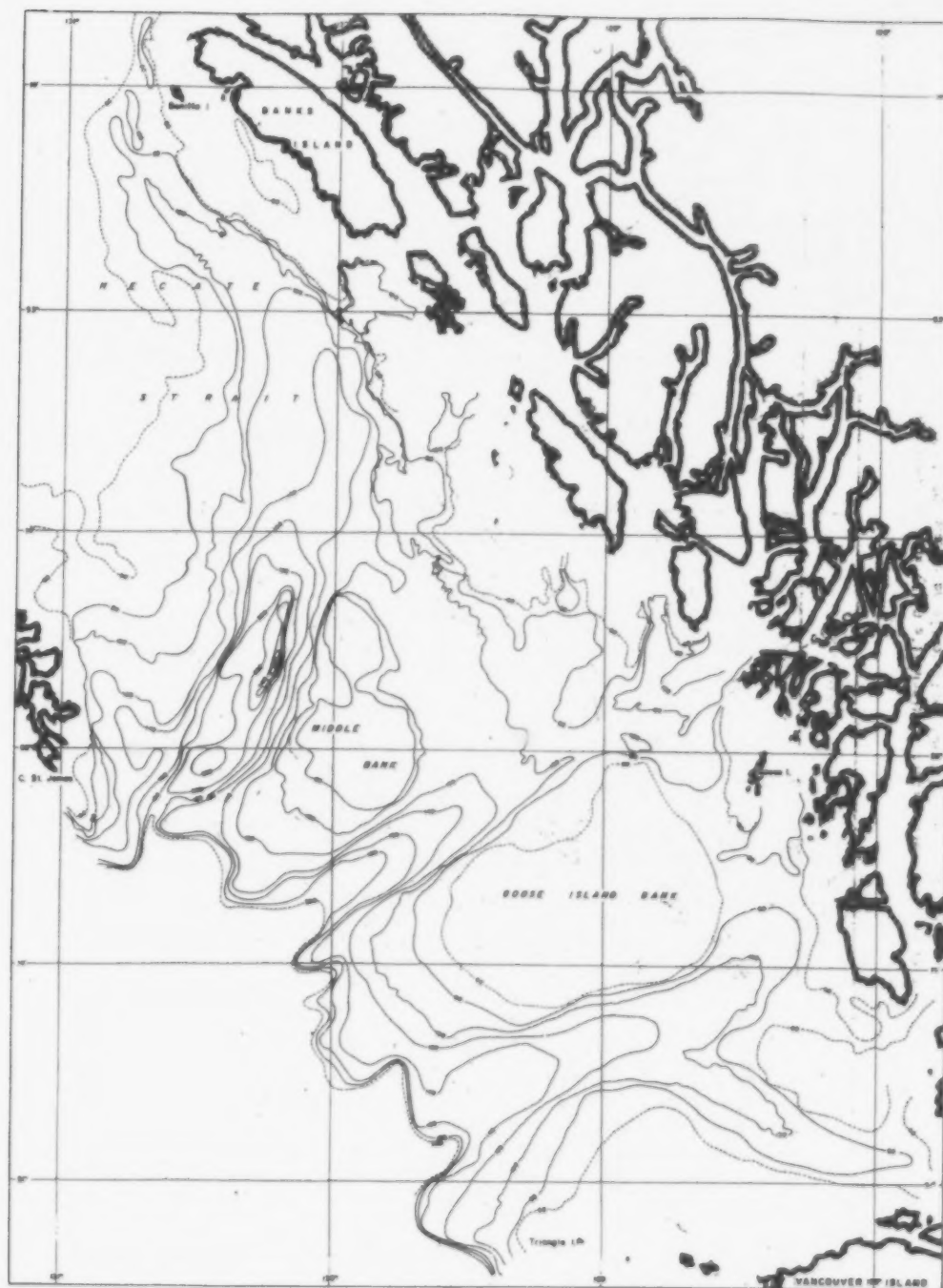


Fig. 3. Bathymetric chart of Queen Charlotte Sound and southern Hecate Strait (from Westrheim 1972, Fig. 5).

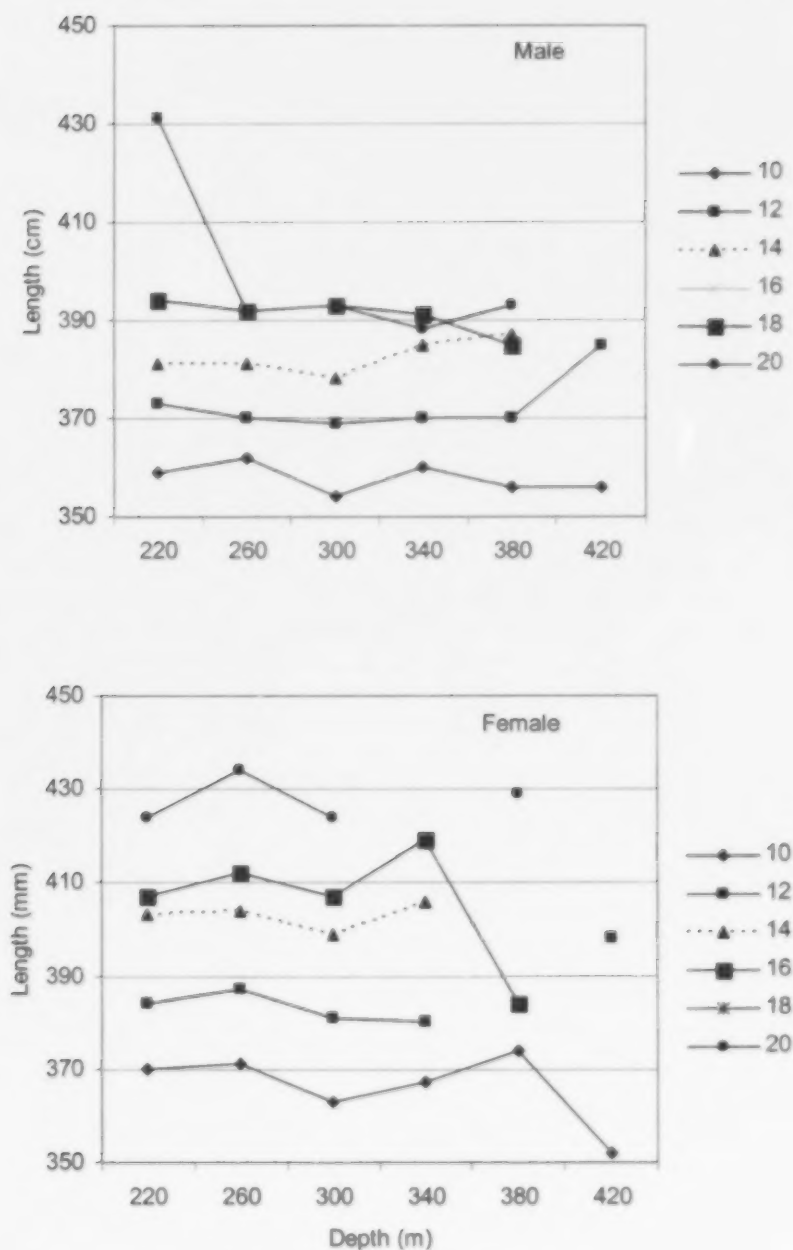


Fig. 4. Mean lengths (mm), by 40-m depth intervals, for selected age groups of male and female Pacific ocean perch landed by "other vessels" from MSA 1W (5E), April-September 1980-99. (Source: Tables 9 and 10, excluding age groups with $N < 5$, and with fewer than four depth intervals represented).

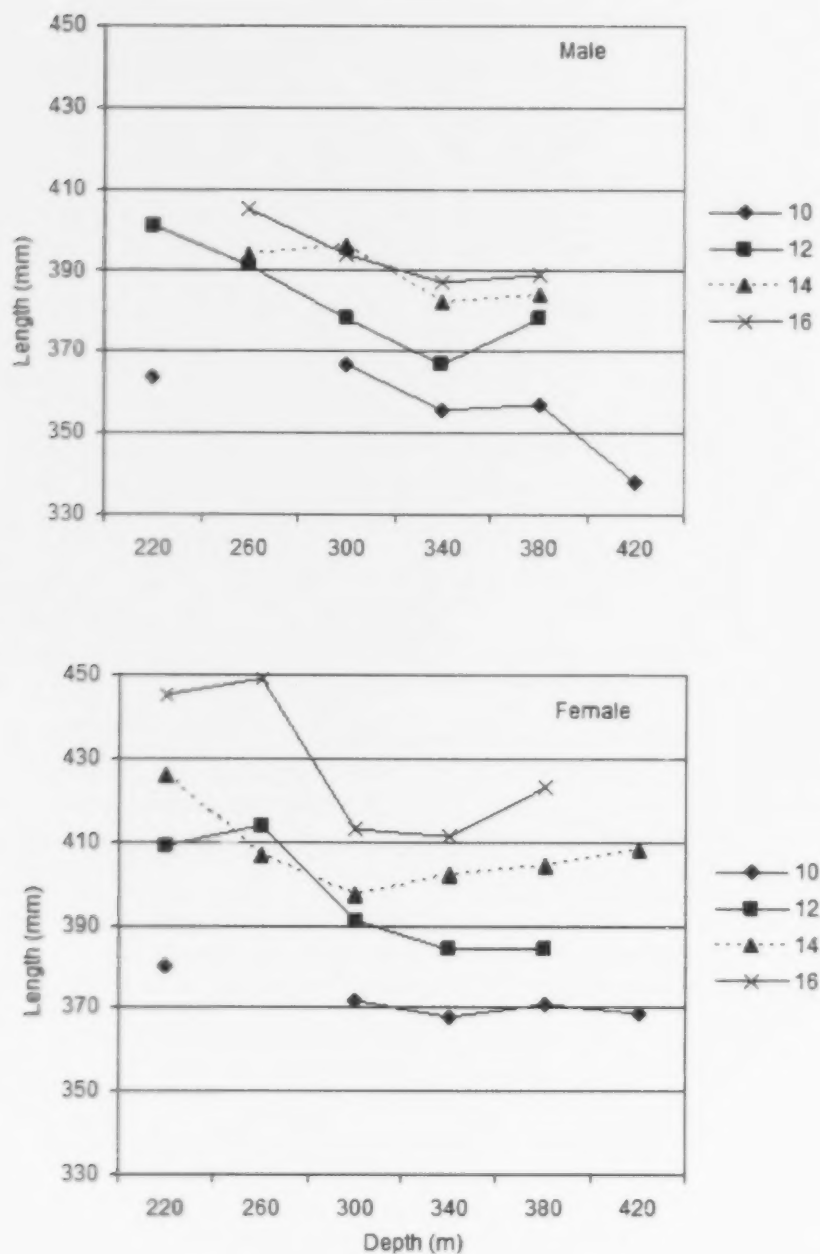


Fig. 5. Mean lengths (mm), by 40-m depth intervals, for selected age groups of male and female Pacific ocean perch landed by "other vessels" from MSA 2AW (5E), January-December 1980-99 (Source: Tables 9 and 10; excluding age groups with $N < 5$, and with fewer than four depth intervals represented).

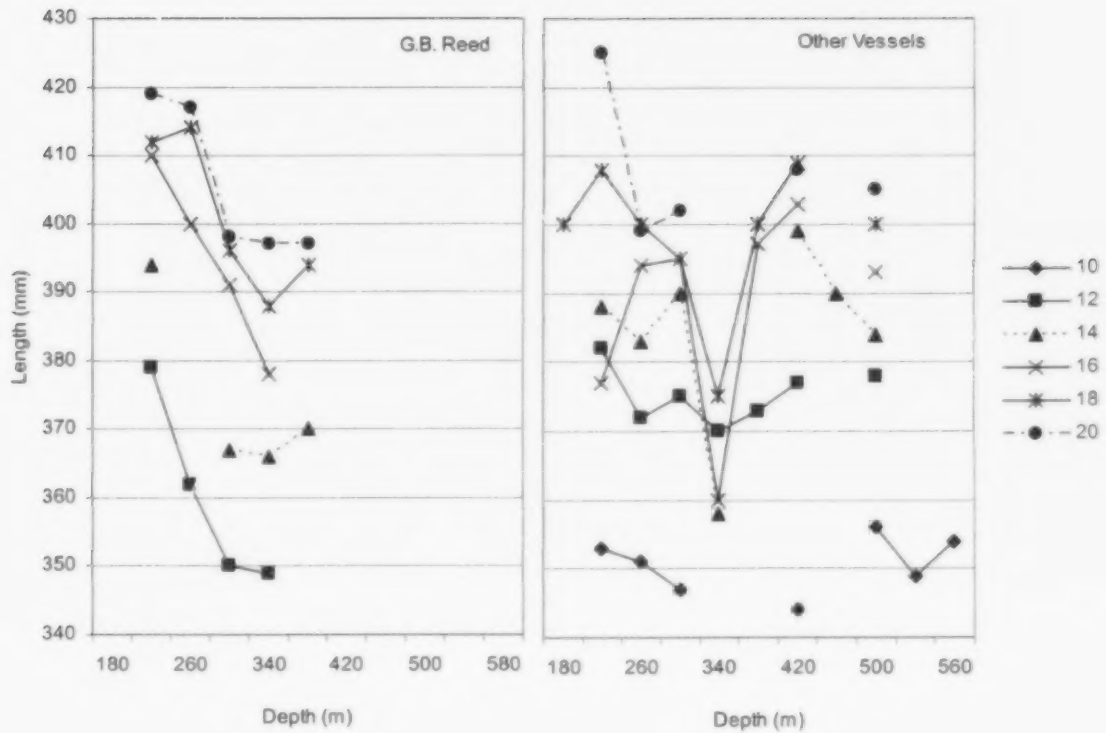


Fig. 6. Mean lengths (mm), by 40-m depth intervals, for selected age groups of male Pacific ocean perch caught in Moresby Gully (5C+5B) by the R/V *G.B. Reed* (September 1974) and "other vessels" (April-September 1980-99) (Source: Table 13; excluding age groups with $N < 5$, and with fewer than four depth intervals represented). N.B. *G.B. Reed* depths are metric equivalents of the mid-points of 20-fm depth intervals.

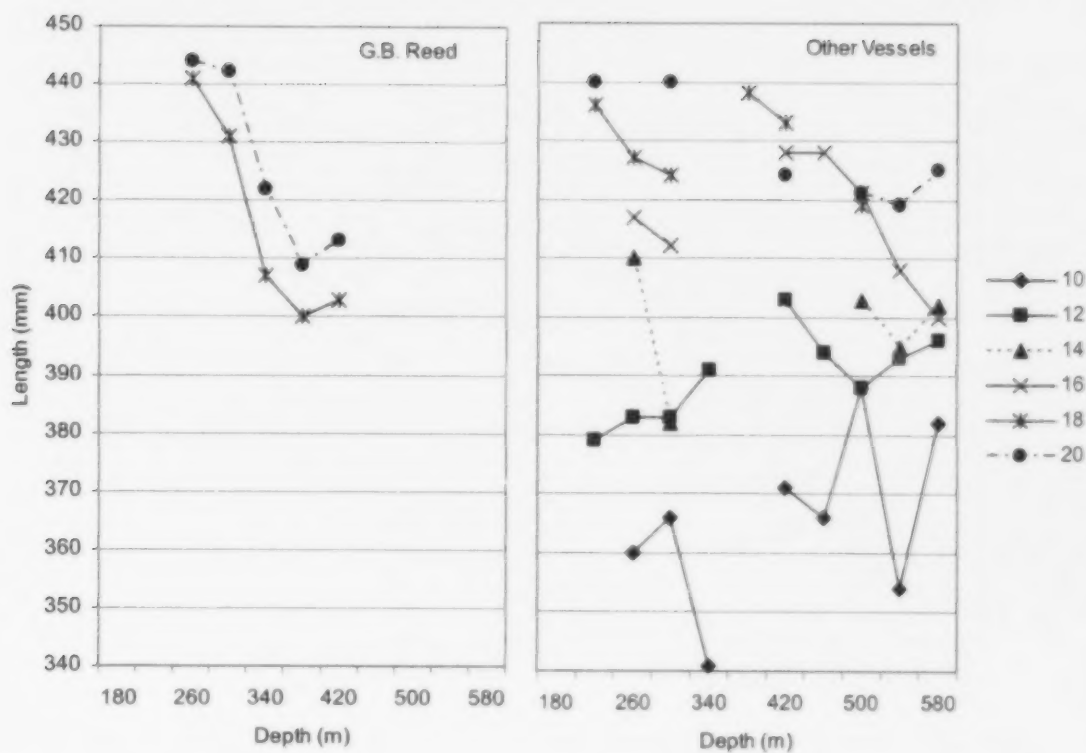


Fig. 7. Mean lengths (mm), by 40-m depth intervals, for selected age groups of female Pacific ocean perch caught in Moresby Gully (5C+5B) by the R/V *G.B. Reed* (September 1974) and "other vessels" (April-September 1980-99) (Source: Table 14; excluding age groups with $N < 5$, and with fewer than four depth intervals represented).
N.B. *G.B. Reed* depths are metric equivalents of the mid-points of 20-fm depth intervals.

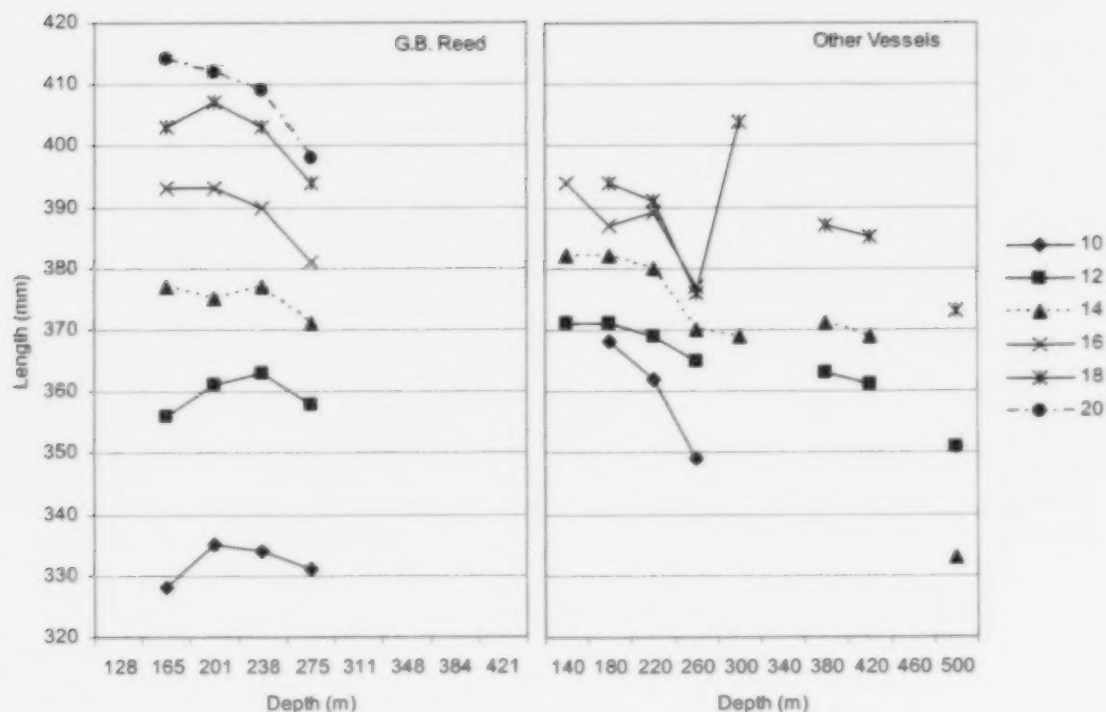


Fig. 8. Mean lengths (mm), by 40-m depth interval (m), for selected age groups of male Pacific ocean perch caught in Goose Island Gully (5B+5An) by the R/V *G.B. Reed* (June-September 1966-76) and "other vessels" (April-September 1980-99) (Source: Table 18; excluding age groups with $N < 5$, and with fewer than four depth intervals represented). N.B. *G.B. Reed* depths are metric equivalents of the mid-points of 20-fm depth intervals.

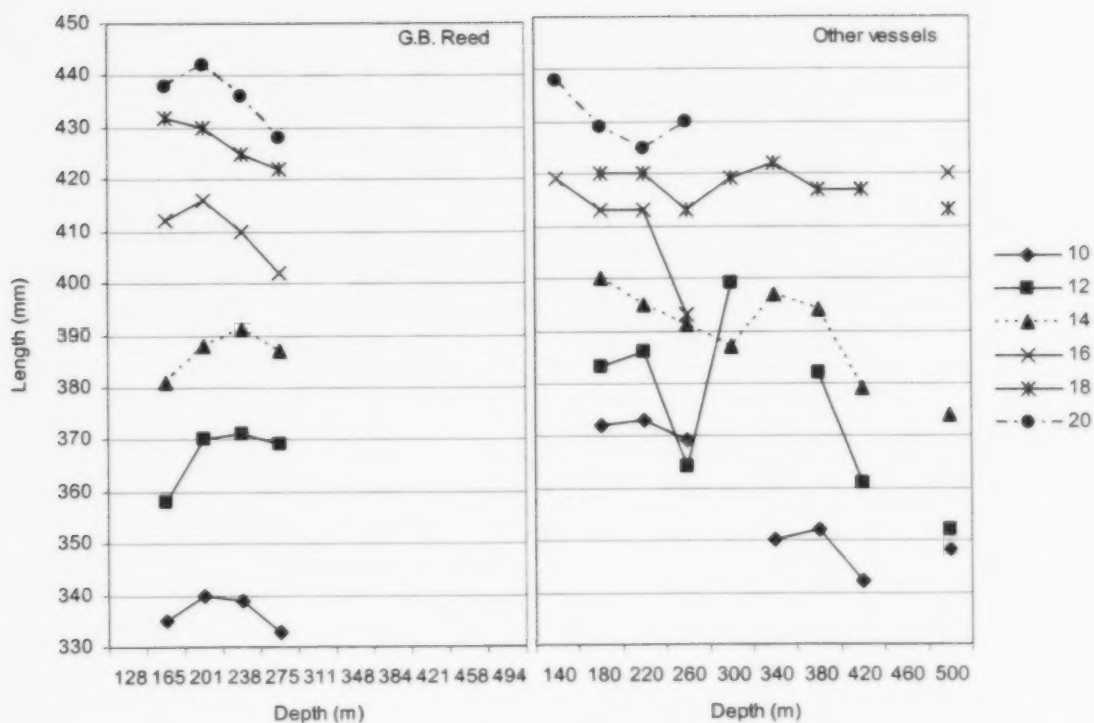


Fig. 9. Mean lengths (mm), by 40-m depth interval (m), for selected age groups of female Pacific ocean perch caught in Goose Island Gully (5B+5An) by the R/V *G.B. Reed* (June-September 1966-76) and "other vessels" (April-September 1980-99) (Source: Table 19; excluding age groups with $N < 5$, and with fewer than four depth intervals represented). N.B. *G.B. Reed* depths are metric equivalents of the mid-points of 20-fm depth intervals.

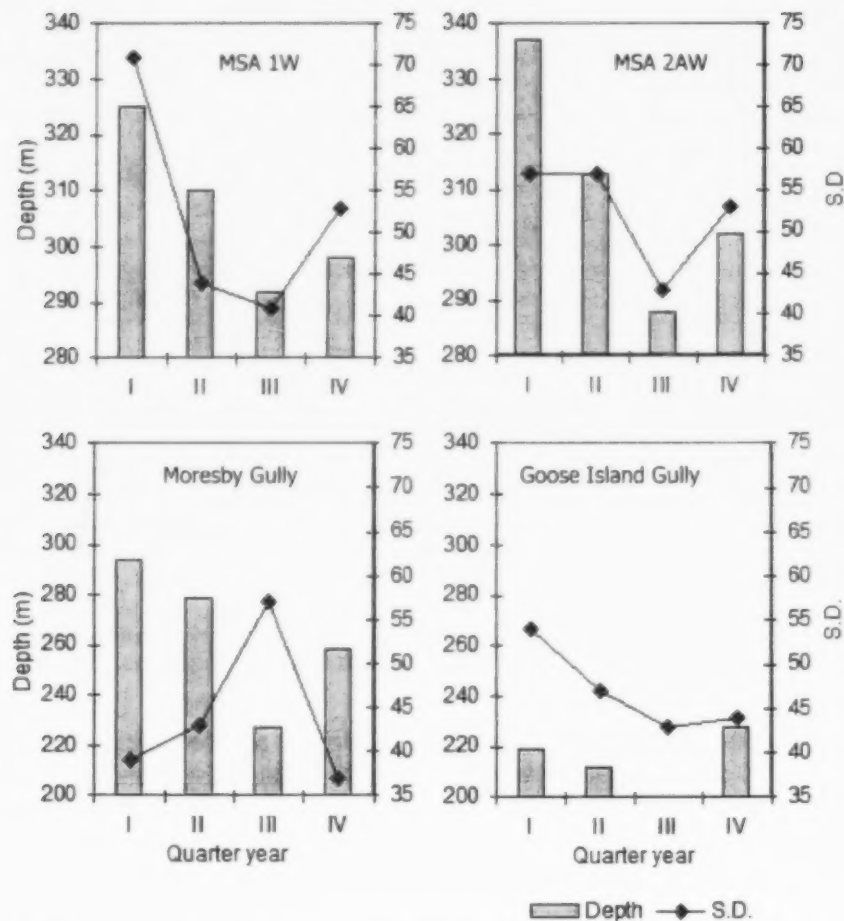


Fig. 10. Mean depths (m), and standard deviations, by quarter year, for Pacific ocean perch caught by commercial vessels in MSA 1W, MSA 2AW, Moresby Gully, and Goose Island Gully, 1980-99 (Source: Tables 7 and 16).

Appendix table 1. Commercial landings (t), by depth and quarter year, of Pacific ocean perch from MSA 1W (5E), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth ^a		Quarter Year				Total	
(fms)	(m)	I	II	III	IV	(t)	
98	180	...	...	4	...		
120	220	20	126	48	66		
142	260	382	1425	514	751		
164	300	606	3227	388	278		
186	340	210	1414	242	269		
208	380	161	354	50	91		
230	420	117	338	7	107		
251	460	22	12	3	6		
273	500	34	30	2	0		
295	540	12	6	...	0.04		
317	580	2	...	...	...		
339	620	18	...	...	...		
361	660	0	...	...	...		
383	700	3	...	...	...		
Total		(t)	1588	6932	1258	1568	11346
		(%)	14.0	61.1	11.1	13.8	100.0
Mean ^b		(m)	325	310	292	298	
		(fms)	177	169	160	163	
S.D.		(m)	71	44	41	53	
C.V.		(%)	22	14	14	18	
120-230	220-420	(t)	1496	6884	1249	1562	
		(%)	94.2	99.3	99.3	99.6	

^a Mid-points of 40-m depth intervals (180 = 160-199, etc.). Equivalent values in fathoms.

^b Weighted to landings.

Appendix table 2. Mean lengths (mm) and numbers of specimens (N), by depth, quarter year, and age group, for male Pacific ocean perch caught by "other vessels" in MSA 1W (5E), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth ^a		10								12							
		I		II		III		IV		I		II		III		IV	
(fm)	(m)	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
120	220	...	0	...	0	359	27	...	0	...	0	...	0	373	21	...	0
142	260	335	2	362	8	362	84	351	95	363	4	385	4	369	72	375	24
164	300	358	16	352	104	359	40	...	0	370	117	369	101	371	33	...	0
186	340	357	6	359	24	361	27	...	0	384	14	363	3	371	19	...	0
208	380	...	0	356	36	357	7	370	4	...	0	365	6	380	3	...	0
230	420	...	0	347	3	363	4	...	0	...	0	...	0	385	15	...	0
Total		24		175		189		99		135		114		163		24	
		14								16							
120	220	...	0	...	0	381	9	...	0	...	0	...	0	395	15	...	0
142	260	...	0	384	5	380	30	381	23	...	0	...	0	368	72	388	42
164	300	376	13	375	20	383	11	...	0	...	0	383	7	387	30	...	0
186	340	...	0	383	11	387	10	...	0	400	2	...	0	391	18	...	0
208	380	...	0	390	7	381	4	385	2	...	0	370	6	393	2	...	0
230	420	...	0	...	0	393	3	...	0	...	0	...	0	398	6	384	5
Total		13		43		67		25		2		13		143		47	
		18								20							
120	220	...	0	...	0	394	5	...	0	...	0	...	0	431	14	...	0
142	260	...	0	...	0	392	9	392	15	...	0	395	2	401	42	383	7
164	300	394	5	395	4	390	3	...	0	...	0	388	9	399	18	...	0
186	340	...	0	...	0	391	5	...	0	...	0	...	0	388	7	...	0
208	380	...	0	385	6	...	0	...	0	...	0	390	2	394	3	...	0
230	420	...	0	...	0	...	0	375	2	...	0	...	0	410	2	...	0
Total		5		10		22		15		0		13		84		7	

^a Mid-points of 40-m depth intervals (220 = 200-239, etc.). Equivalent values in fathoms.

Appendix table 3. Mean lengths (mm) and numbers of specimens (N), by depth, quarter year, and age group, for female Pacific ocean perch caught by "other vessels" in MSA 1W (5E), 1980-99 (Source: Groundfish Data Base, GFBio).

Depth ^a		10								12							
		I		II		III		IV		I		II		III		IV	
(fm)	(m)	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
120	220	...	0	...	0	370	20	...	0	...	0	...	0	384	22	...	0
142	260	...	0	369	13	372	45	372	43	385	13	375	2	387	78	391	14
164	300	353	13	360	122	371	41	...	0	376	78	382	110	388	47	...	0
186	340	379	12	367	37	366	28	...	0	398	20	390	2	379	16	...	0
208	380	340	2	374	49	374	16	395	4	...	0	383	3	...	0	373	3
230	420	...	0	350	63	372	5	357	6	...	0	...	0	398	6	...	0
Total			27		221		150		47		111		117		163		17
		14								16							
		I		II		III		IV		I		II		III		IV	
120	220	...	0	...	0	403	13	...	0	...	0	...	0	407	28	...	0
142	260	397	3	403	8	404	24	399	14	420	2	...	0	412	41	403	37
164	300	398	14	402	32	392	17	398	63	411	8	386	7	415	17	408	32
186	340	...	0	406	18	406	4	406	22	...	0	...	0	419	11	...	0
208	380	...	0	395	2	...	0	398	4	...	0	384	8	...	0	...	0
230	420	...	0	395	2	...	0	...	0	...	0	...	0	...	0	403	3
Total			17		60		58		103		10		15		97		69
		18								20							
		I		II		III		IV		I		II		III		IV	
120	220	...	0	...	0	...	0	...	0	...	0	...	0	424	14	...	0
142	260	...	0	...	0	422	7	420	12	...	0	410	2	436	23	424	7
164	300	428	4	419	7	427	7	...	0	430	4	412	5	428	13	425	22
186	340	415	2	...	0	434	4	...	0	...	0	435	2	439	2	437	4
208	380	...	0	...	0	...	0	...	0	...	0	...	0	429	7	...	0
230	420	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
Total			6		7		18		12		4		9		59		33

^a Mid-points of 40-m depth intervals (220 = 200-239, etc.). Equivalent values in fathoms.

Appendix table 4. Commercial landings (t), by depth and quarter year, of Pacific ocean perch from MSA 2AW (5E), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth ^a		Quarter Year				Total	
(fms)	(m)	I	II	III	IV	(t)	
77	140	2	...	...	...		
98	180	1	4	...	14		
120	220	133	188	162	241		
142	260	193	238	262	219		
164	300	721	462	479	434		
186	340	1141	480	151	442		
208	380	359	131	23	149		
230	420	212	103	16	23		
251	460	78	11	3	2		
273	500	7	8	...	1		
295	540	42	1	...	0		
317	580	1	0.2	...	1		
339	620	0.4	0	...	...		
361	660	0	1	...	...		
383	700	0.1	...	...	...		
	Total	(t)	2891	1627	1096	1526	7140
		(%)	40.5	22.8	15.4	21.4	100.0
	Mean ^b	(m)	337	313	288	302	
		(fms)	184	171	157	165	
	S.D.	(m)	57	57	43	53	
	C.V.	(%)	17	18	15	17	
120-230	220-420	(t)	2759	1602	1093	1508	
		(%)	95.4	98.5	99.7	98.8	

^a Mid-points of 40-m depth intervals (140 = 120-159, etc.) Equivalent values in fathoms.

^b Weighted to landings.

Appendix table 5. Mean lengths (mm) and numbers of specimens (N), by depth, quarter year, and age group, for male Pacific ocean perch caught by "other vessels" in MSA 2AW (5E), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth ^a		10								12							
		I		II		III		IV		I		II		III		IV	
(fm)	(m)	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
120	220	...	0	...	0	...	0	364	5	...	0	...	0	401	8	...	0
142	260	375	2	365	2	...	0	...	0	...	0	395	6	380	2	...	0
164	300	360	2	...	0	364	7	380	3	380	5	382	16	350	5	392	5
186	340	359	28	348	8	348	4	358	6	364	40	369	10	...	0	378	8
208	380	360	41	340	7	...	0	...	0	380	33	372	9	...	0	...	0
230	420	338	5	...	0	...	0	...	0	360	4	...	0	...	0	...	0
251	460	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
273	500	345	8	...	0	...	0	...	0	357	3	...	0	...	0	...	0
Total		86		17		11		14		85		41		15		13	

Depth ^a		14								16							
		I		II		III		IV		I		II		III		IV	
(fm)	(m)	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
120	220	...	0	...	0	...	0	385	2	...	0	...	0	405	2	400	2
142	260	400	2	390	2	...	0	393	4	400	3	420	3	395	2	400	2
164	300	393	4	...	0	398	4	...	0	...	0	391	7	...	0	397	7
186	340	392	9	362	5	385	2	385	3	397	3	368	4	398	2	400	2
208	380	387	13	367	3	392	2	...	0	393	3	387	7	...	0	...	0
230	420	383	3	...	0	...	0	...	0	...	0	...	0	...	0	...	0
251	460	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
273	500	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
Total		31		10		8		9		9		21		6		13	

^a Mid-points of 40-m depth intervals (220 = 200-239, etc.). Equivalent values in fathoms.

Appendix table 5 cont'd. Mean lengths (mm) and numbers of specimens (N), by depth, quarter year, and age group, for male Pacific ocean perch caught by "other vessels" in MSA 2AW (5E), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

		18								20							
Depth ^a		I		II		III		IV		I		II		III		IV	
(fm)	(m)	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
120	220	...	0	...	0	...	0	400	2	...	0	...	0	...	0	...	0
142	260	405	2	...	0	...	0	...	0	...	0	...	0	...	0	...	0
164	300	405	2	380	2	405	2	400	3	...	0	387	3	...	0	...	0
186	340	397	3	410	2	386	2	...	0	...	0	...	0	...	0	...	0
208	380	380	2	...	0	...	0	...	0	...	0	...	0	...	0	...	0
230	420	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
251	460	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
273	500	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
Total			9		4		4		5		0		3		0		0

^a Mid-points of 40-m depth intervals (220 = 200-239, etc.). Equivalent values in fathoms.

Appendix table 5. Mean lengths (mm) and numbers of specimens (N), by depth, quarter year, and age group, for female Pacific ocean perch caught by "other vessels" in MSA 2AW (5E), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth ^a		10								12							
		I		II		III		IV		I		II		III		IV	
(fm)	(m)	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
120	220	...	0	...	0	380	6	380	3	...	0	...	0	409	10	407	3
142	260	...	0	...	0	...	0	...	0	...	0	404	12	403	2	405	2
164	300	...	0	370	4	365	10	393	4	...	0	385	20	390	10	403	12
186	340	371	42	361	11	363	5	369	3	384	99	387	20	...	0	383	5
208	380	376	49	352	12	...	0	...	0	384	31	384	13	...	0	...	0
230	420	369	8	...	0	...	0	...	0	370	2	...	0	...	0	...	0
Total		99		27		21		10		132		65		22		22	
		14								16							
120	220	...	0	...	0	440	3	405	2	...	0	...	0	458	4	420	2
142	260	...	0	440	2	...	0	394	5	...	0	449	10	...	0	...	0
164	300	...	0	392	9	386	5	414	6	...	0	410	25	427	3	418	4
186	340	408	12	393	12	409	5	400	4	420	3	408	6	...	0	407	3
208	380	404	14	404	7	...	0	...	0	421	7	427	3	...	0	...	0
230	420	408	5	...	0	...	0	...	0	...	0	...	0	...	0	...	0
Total		31		30		13		17		10		44		7		9	
		18								20							
120	220	...	0	...	0	...	0	423	3	...	0	...	0	...	0	...	0
142	260	...	0	...	0	...	0	...	0	...	0	...	0	446	2	...	0
164	300	...	0	430	3	...	0	430	3	...	0	420	7	423	2	440	2
186	340	417	3	428	5	...	0	...	0	...	0	...	0	...	0	...	0
208	380	453	3	...	0	...	0	...	0	...	0	...	0	...	0	...	0
230	420	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
Total		6		8		0		6		0		7		4		2	

^a Mid-points of 40-m depth intervals (220=200-239, etc.). Equivalent values in fathoms.

Appendix table 7. Catch rates (nos/h) and numbers of hauls (N), by 20-fm depth interval, and cruise date, for Pacific ocean perch caught by the R/V *G.B. Reed* in Moresby Gully (1973-78) and Goose Island Gully (1966-76) (Sources listed below).

Depth ^a		Jun-Jul 73		Sep-74		Aug-Sep 78	
(m)	(fms)	(nos/h)	N	(nos/h)	N	(nos/h)	N
Moresby Gully							
165	90	1710	7	562	5	609	6
201	110	1147	8	2291	8	2954	6
238	130	1002	7	1583	6	1307	9
275	150	408	9	1027	6	1139	10
311	170	576	6	587	4	727	6
348	190	379	2	609	2	448	4
384	210	30	1	104	1	131	3
421	230	...	0	418	1	146	1
Total			40		33		45

Depth ^a		Aug-Sep 66		Sep-Oct 67		Sep-69		Jun-70		Jun-71		Oct-71		Sep-73		Sep-76	
(m)	(fms)	(nos/h)	N	(nos/h)	N	(nos/h)	N	(nos/h)	N	(nos/h)	N	(nos/h)	N	(nos/h)	N	(nos/h)	N
Goose Island Gully																	
128	70	1369	2	...	0	...	0	...	0	...	0	...	0	...	0	...	0
165	90	370	2	1832	6	3940	7	869	5	1424	4	44	5	736	7	358	7
201	110	2448	5	3028	11	1461	11	2748	10	1789	5	1739	14	729	11	1730	15
238	130	2338	3	3162	6	2175	6	2300	6	1631	4	2849	9	807	7	1252	7
275	150	2961	2	3340	6	3238	4	1798	4	2522	3	2565	9	1353	7	1896	6
Total			14		29		28		25		16		37		32		35

^a Mid-points of 20-fm depth intervals (90 = 80-99, etc.). Equivalent values in meters.

Original sources: Aug-Sep 66, Westrheim (1967a,b); Sep-Oct 67, Westrheim *et al.* (1968); Sep 69, Harling *et al.* (1969); Jun 71, Davenport *et al.* (1971); Oct 71, Harling *et al.* (1971); Jun-Jul 73, Westrheim *et al.* (1973); Sep 73, Harling *et al.* (1973); Sep 74 Westrheim *et al.* (1974b); Sep 76, Westrheim *et al.* (1976); Aug-Sep 78, Harling *et al.* (1978).

Appendix table 8. Commercial landings (t), by depth and quarter year, of Pacific ocean perch from Moresby Gully (5C+5B), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth ^a		I		II		III		IV		Total
(fm)	(m)	(t)	(%)	(t)	(%)	(t)	(%)	(t)	(%)	(t)
11	20	0.01	0.0	0.1	0.0	1	0.0	0.005	0.0	
33	60	0	0	0.1	0.0	11	0.2	0.01	0.0	
55	100	3	0.1	8	0.1	72	1.1	3	0.1	
77	140	1	0.0	29	0.2	951	14.0	18	0.3	
98	180	14	0.4	443	3.0	1053	15.5	318	5.1	
120	220	182	5.4	1823	12.3	1756	25.9	1376	21.9	
142	260	969	28.6	5417	36.5	1824	26.9	3122	49.6	
164	300	1528	45.2	5071	34.1	802	11.8	1252	19.9	
186	340	522	15.4	1597	10.8	259	3.8	141	2.2	
208	380	124	3.7	416	2.8	40	0.6	59	0.9	
230	420	38	1.1	31	0.2	13	0.2	3	0.1	
251	460	1	0.0	6	0.0	2	0.0	2	0.0	
273	500	0	0	2	0.0	0.2	0.0	0.1	0.0	
295	540	0.01	0.0	6	0.0	...	...	0.04	0.0	
317	580	...	...	0.02	0.0	...	...	...	...	
Total		(t)								
		(%)								
Mean ^b		(m)								
		(fms)								
S.D.		(m)								
C.V.		(%)								

^a Mid-points of 40-m depth intervals (20 = 0-39 m, etc.). Equivalent values in fathoms.

^b Weighted to landings.

Appendix table 9. Mean lengths (mm) and numbers of specimens (N), by depth, area, age group, and quarter year, of male Pacific ocean perch caught by "other vessels" in Moresby Gully (5C+5B), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

			10								12							
Depth ^a		Area	I		II		III		IV		I		II		III		IV	
(fm)	(m)		(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
98	180	5C	...	0	...	0	348	3	...	0	...	0	375	2	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
120	220	5C	...	0	347	3	354	5	...	0	...	0	...	0	375	2	...	0
		5B	...	0	...	0	360	2	377	3	...	0	...	0	375	2	...	0
142	260	5C	...	0	...	0	330	3	...	0	...	0	388	4	320	2	...	0
		5B	345	2	342	6	348	5	370	2	370	6	...	0	382	10	365	4
164	300	5C	...	0	363	7	...	0	...	0	...	0	...	0	...	0	...	0
		5B	...	0	350	5	...	0	...	0	363	3	375	4	387	4	365	2
186	340	5C	...	0	...	0	343	3	...	0	350	3	...	0	375	15	...	0
		5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
208	380	5C	...	0	...	0	320	3	355	4	...	0	...	0	360	3	370	5
		5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
230	420	5C	339	8	344	5	362	15	358	8	...	0	381	10	373	6	365	2
		5B	...	0	...	0	350	2	...	0	...	0	...	0	390	3	...	0
251	460	5C	...	0	355	2	...	0	370	2	...	0	370	3	...	0	...	0
		5B	...	0	357	28	...	0	342	13	...	0	...	0	377	3	...	0
273	500	5C	335	4	395	2	...	0	365	23	374	25	378	11	...	0	...	0
		5B	354	37	346	8	...	0	...	0	...	0	377	12	...	0	...	0
295	540	5B	340	4	349	10	...	0	363	16	364	5	377	58	...	0	...	0
317	580	5B	346	18	354	45	...	0	...	0	375	75	375	4	...	0	380	2
339	620	5B	...	0	...	0	...	0	...	0	...	0	380	2	...	0	...	0
361	660	5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	393	3
Total			73		121		41		71		117		110		50		18	

Appendix table 9 cont'd. Mean lengths (mm) and numbers of specimens (N), by depth, area, age group, and quarter year, of male Pacific ocean perch caught by "other vessels" in Moresby Gully (5C+5B), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth* (fm)	Area (m)		14								16							
			I		II		III		IV		I		II		III		IV	
			(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
98	180	5C	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
120	220	5C	...	0	385	6	378	4	...	0	...	0	...	0	377	3	...	0
		5B	...	0	401	3	390	2	386	4	...	0	...	0	...	0	...	0
142	260	5C	...	0	...	0	380	3	...	0	...	0	...	0	...	0	...	0
		5B	396	3	...	0	382	3	385	4	388	2	405	2	...	0	...	0
164	300	5C	...	0	410	2	...	0	...	0	...	0	420	3	407	3	...	0
		5B	380	2	386	8	387	5	...	0	...	0	388	5	...	0	...	0
186	340	5C	360	3	355	2	...	0	...	0	368	6	363	3	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
208	380	5C	...	0	370	2	...	0	...	0	...	0	...	0	...	0	396	5
		5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
230	420	5C	...	0	396	7	...	0	402	9	...	0	400	3	...	0	405	4
		5B	...	0	...	0	...	0	...	0	...	0	400	3	415	2	...	0
251	460	5C	...	0	383	3	...	0	400	2	...	0	387	7	...	0	...	0
		5B	...	0	...	0	...	0	392	6	...	0	395	4	...	0	...	0
273	500	5C	370	3	388	6	...	0	370	3	...	0	393	11	...	0	...	0
		5B	375	6	386	16	385	2	...	0	392	5	391	12	397	11	...	0
295	540	5B	...	0	...	0	...	0	385	4	397	9	389	6	...	0	...	0
317	580	5B	...	0	390	4	...	0	390	4	...	0	398	5	...	0	...	0
339	620	5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
361	660	5B	...	0	...	0	...	0	395	2	...	0	...	0	...	0	...	0
Total			17		59		19		38		22		64		19		9	

Appendix table 9 cont'd. Mean lengths (mm) and numbers of specimens (N), by depth, area, age group, and quarter year, of male Pacific ocean perch caught by "other vessels" in Moresby Gully (5C+5B), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

			18								20							
Depth ^a		Area	I		II		III		IV		I		II		III		IV	
(fm)	(m)		(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
98	180	5C	...	0	...	0	385	2	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
120	220	5C	...	0	...	0	395	2	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	...	0	430	4	...	0
142	260	5C	...	0	...	0	387	3	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	404	2	395	3	401	6	...	0	394	6	...	0
164	300	5C	...	0	422	5	...	0	...	0	...	0	400	4	396	5	...	0
		5B	...	0	410	3	...	0	...	0	408	4	400	7	...	0	405	2
186	340	5C	368	6	384	5	...	0	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	...	0	...	0	400	4	...	0	...	0	...	0
208	380	5C	...	0	400	3	...	0	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
230	420	5C	...	0	404	5	414	5	...	0	...	0	406	10	...	0	413	3
		5B	...	0	405	4	405	4	...	0	...	0	...	0	...	0	...	0
251	460	5C	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	...	0	400	5	...	0	...	0	...	0	...	0
273	500	5C	...	0	394	9	...	0	417	3	...	0	405	10	...	0	...	0
		5B	400	3	401	8	...	0	...	0	402	9	404	7	...	0	...	0
295	540	5B	...	0	392	6	...	0	395	2	...	0	407	3	...	0	398	4
317	580	5B	410	2	390	8	...	0	...	0	...	0	...	0	...	0	...	0
339	620	5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
361	660	5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
Total			11		56		18		13		23		41		15		9	

^a Mid-points of 40-m depth intervals (180 = 160-199, etc.). Equivalent values in fathoms.

Appendix table 10. Mean lengths (mm) and numbers of specimens (N), by depth, area, age group, and quarter year, of female Pacific ocean perch caught by "other vessels" in Moresby Gully (5C+5B), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

			10								12							
Depth ^a		Area	I		II		III		IV		I		II		III		IV	
(fm)	(m)		(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
98	180	5C	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	...	0	360	4	...	0
120	220	5C	...	0	...	0	...	0	...	0	...	0	375	2	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	...	0	380	5	...	0
142	260	5C	...	0	...	0	317	3	...	0	...	0	...	0	...	0	...	0
		5B	370	2	...	0	382	6	...	0	355	2	384	10	381	5	...	0
164	300	5C	...	0	...	0	...	0	...	0	...	0	383	3	...	0	...	0
		5B	...	0	366	5	...	0	367	3	350	2	...	0	...	0	...	0
186	340	5C	...	0	...	0	317	3	...	0	...	0	365	2	398	8	...	0
		5B	...	0	...	0	378	2	...	0	383	4	...	0	...	0	...	0
208	380	5C	...	0	...	0	...	0	363	4	...	0	...	0	395	2	380	2
		5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
230	420	5C	348	4	345	2	367	14	354	7	...	0	405	6	...	0	385	4
		5B	...	0	...	0	400	4	335	2	...	0	...	0	400	4	...	0
251	460	5C	...	0	...	0	...	0	...	0	...	0	...	0	400	3	...	0
		5B	...	0	363	24	405	2	360	14	...	0	380	3	405	2	...	0
273	500	5C	325	2	385	2	...	0	367	31	...	0	396	5	...	0	...	0
		5B	362	23	410	2	370	2	...	0	379	11	383	19	394	8	...	0
295	540	5B	...	0	354	19	...	0	373	13	386	7	392	97	450	2	...	0
317	580	5B	363	3	382	26	...	0	...	0	379	28	396	8	...	0	...	0
339	620	5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
361	660	5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
Total			34		80		36		74		54		155		43		6	

Appendix table 10 cont'd. Mean lengths (mm) and numbers of specimens (N), by depth, area, age group, and quarter year, of female Pacific ocean perch caught by "other vessels" in Moresby Gully (5C+5B), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

			14								16							
Depth ^a		Area	I		II		III		IV		I		II		III		IV	
(fm)	(m)		(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
98	180	5C	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	410	2	...	0	...	0	...	0	...	0	...	0
120	220	5C	...	0	...	0	420	2	405	2	...	0	...	0	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	407	2	...	0	...	0
142	260	5C	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
		5B	379	4	...	0	410	9	384	2	407	3	418	5	416	7	412	5
164	300	5C	...	0	375	2	...	0	...	0	...	0	425	4	...	0	...	0
		5B	385	2	386	3	...	0	...	0	...	0	...	0	...	0	...	0
186	340	5C	...	0	390	2	...	0	...	0	...	0	385	2	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
208	380	5C	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	415	2	...	0	...	0
230	420	5C	...	0	370	2	...	0	423	7	...	0	...	0	...	0	430	2
		5B	...	0	...	0	...	0	...	0	...	0	430	4	427	7	...	0
251	460	5C	...	0	...	0	...	0	403	3	...	0	...	0	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	415	2	435	4	420	2
273	500	5C	...	0	408	5	...	0	...	0	...	0	419	11	...	0	...	0
		5B	...	0	399	14	415	2	...	0	362	28	416	12	427	11	...	0
295	540	5B	397	3	399	7	380	2	414	7	...	0	408	12	...	0	430	4
317	580	5B	...	0	402	12	...	0	...	0	383	3	400	12	...	0	...	0
339	620	5B	...	0	...	0	...	0	...	0	...	0	415	2	...	0	...	0
361	660	5B	...	0	...	0	...	0	407	3	...	0	...	0	...	0	...	0
Total				9		47		17		24		34		70		29		13

Appendix table 10 cont'd. Mean lengths (mm) and numbers of specimens (N), by depth, area, age group, and quarter year, of female Pacific ocean perch caught by "other vessels" in Moresby Gully (5C+5B), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

			18								20							
Depth ^a		Area	I		II		III		IV		I		II		III		IV	
(fm)	(m)		(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
98	180	5C	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
120	220	5C	...	0	...	0	436	5	...	0	...	0	440	2	440	4	435	2
		5B	...	0	...	0	...	0	445	2	...	0	...	0	...	0	...	0
142	260	5C	...	0	...	0	427	3	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	427	2	...	0	427	3	430	4	...	0	423	6
164	300	5C	...	0	432	5	...	0	...	0	...	0	450	2	436	5	...	0
		5B	...	0	410	3	...	0	...	0	...	0	...	0	...	0	...	0
186	340	5C	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
208	380	5C	...	0	...	0	432	5	430	2	...	0	...	0	...	0	...	0
		5B	...	0	445	2	445	2	...	0	...	0	...	0	...	0	...	0
230	420	5C	...	0	420	2	435	2	...	0	...	0	421	9	435	2	...	0
		5B	...	0	437	3	437	3	...	0	...	0	...	0	...	0	...	0
251	460	5C	...	0	410	3	...	0	...	0	...	0	...	0	...	0	...	0
		5B	...	0	...	0	...	0	430	3	...	0	...	0	...	0	...	0
273	500	5C	...	0	421	9	...	0	...	0	...	0	427	9	...	0	435	2
		5B	380	8	418	12	...	0	...	0	...	0	417	12	...	0	...	0
295	540	5B	...	0	395	4	...	0	...	0	...	0	419	12	...	0	427	3
317	580	5B	379	28	...	0	...	0	...	0	...	0	425	12	...	0	...	0
339	620	5B	...	0	415	2	...	0	...	0	...	0	...	0	...	0	...	0
361	660	5B	...	0	...	0	...	0	433	3	...	0	...	0	...	0	...	0
Total			36		45		22		10		3		62		11		13	

^a Mid-points of 40-m depth intervals (180 = 160-199, etc.). Equivalent values in fathoms.

Appendix table 11. Mean lengths (cm) and numbers of specimens (N), by age group, 20-fm depth interval, and selected years, for male Pacific ocean perch caught by the R/V *G.B. Reed* in Goose Island Gully (5B+5An), 1966-76 (Source: PBS Scientific Archive DN/2/13).

Age (yr)		80-99 fms							100-119 fms						
		1966	1967	1969	1970	1973	1976	Mean ^a	1966	1967	1969	1970	1973	1976	Mean ^a
10	cm	34.5	34.4	32.2	32.2	34.1	33.9	32.8	32.6	33.8	32.4	32.7	35.0	34.7	33.5
	N	4	7	31	55	11	20	128	16	7	20	64	21	43	171
12	cm	35.8	35.3	35.3	34.5	35.4	36.0	35.6	35.1	35.6	35.0	34.8	36.4	36.9	36.1
	N	3	13	10	4	12	28	70	24	23	13	12	21	68	161
14	cm	37.9	37.5	37.3	38.5	39.8	37.5	37.7	36.3	38.4	37.2	37.5	38.5	38.0	37.5
	N	8	5	6	4	3	37	63	55	37	27	17	2	75	213
16	cm	...	...	39.0	39.5	...	38.8	39.3	38.6	39.6	39.2	39.2	40.3	40.0	39.3
	N	0	0	11	26	0	4	41	14	15	54	39	9	14	145
18	cm	39.0	...	40.3	40.3	41.5	40.2	40.3	40.0	40.9	40.4	40.3	41.4	41.7	40.7
	N	2	0	10	11	2	3	28	4	5	38	31	16	10	104
20	cm	...	...	41.0	41.5	...	41.5	41.4	40.5	41.6	41.0	41.5	41.0	41.4	41.2
	N	0	0	2	3	0	3	8	5	18	23	4	4	14	68

Appendix table 11 cont'd. Mean lengths (cm) and numbers of specimens (N), by age group, 20-fm depth interval, and selected years, for male Pacific ocean perch caught by the R/V *G.B. Reed* in Goose Island Gully (5B+5An), 1966-76 (Source: PBS Scientific Archive DN/2/13).

Age (yr)		120-139 fms							140-159 fms						
		1966	1967	1969	1970	1973	1976	Mean ^a	1966	1967	1969	1970	1973	1976	Mean ^a
10	cm	33.1	33.0	32.3	32.1	34.5	34.9	33.4	...	33.5	31.7	30.7	34.1	35.1	33.1
	N	8	2	6	22	6	23	67	0	4	10	22	30	19	85
12	cm	35.9	36.3	35.8	35.5	36.6	36.4	36.3	35.5	35.7	34.2	33.1	36.3	36.4	35.8
	N	14	15	6	8	17	46	106	3	20	9	10	40	37	119
14	cm	37.4	38.1	37.3	37.0	38.3	37.9	37.7	36.4	37.3	36.3	35.3	38.0	37.5	37.1
	N	49	39	18	12	6	37	161	14	74	20	10	13	36	167
16	cm	39.3	39.5	39.0	38.5	39.6	38.7	39.0	38.0	38.5	38.0	37.2	39.6	38.5	38.1
	N	18	23	36	37	8	10	132	6	21	57	31	15	9	139
18	cm	40.1	40.7	40.0	39.8	41.0	40.5	40.3	38.7	38.8	39.7	38.5	40.8	39.5	39.4
	N	12	13	19	23	11	13	91	9	19	34	23	21	8	114
20	cm	40.7	41.0	40.6	39.8	41.8	40.9	40.9	39.0	39.3	39.7	38.3	41.6	40.6	39.8
	N	6	6	10	3	6	14	45	10	6	27	8	11	8	70

^a Weighted to number of observations (N).

Appendix table 12. Mean lengths (cm) and numbers of specimens (N), by age group, 20-fm depth interval, and selected years, for female Pacific ocean perch caught by the R/V *G.B. Reed* in Goose Island Gully (5B+5An), 1966-76 (Source: PBS Scientific Archive DN/2/13).

Age (yr)		80-99 fms							100-119 fms						
		1966	1967	1969	1970	1973	1976	Mean*	1966	1967	1969	1970	1973	1976	Mean*
10	cm	34.3	32.8	32.8	32.4	33.5	34.5	33.5	32.9	35.2	33.2	32.9	36.0	35.5	34.0
	N	4	6	30	46	9	78	173	17	6	22	43	8	36	132
12	cm	35.2	35.4	35.1	35.8	35.5	36.6	35.8	36.1	35.9	36.4	35.0	38.7	37.7	37.0
	N	6	9	11	3	8	22	59	20	21	10	11	22	49	133
14	cm	39.9	38.7	37.1	39.1	42.5	37.5	38.1	37.7	39.2	38.7	39.4	42.2	39.4	38.8
	N	9	5	10	5	2	44	75	51	27	20	17	3	38	156
16	cm	41.5	43.5	39.6	41.4	41.0	41.0	41.2	40.5	41.9	41.1	41.7	43.2	42.0	41.6
	N	4	3	7	14	2	2	32	15	20	43	55	9	15	157
18	cm	43.3	...	42.3	44.8	...	...	43.2	41.5	41.8	42.8	42.9	43.8	44.1	43.0
	N	4	0	6	3	0	0	13	2	7	47	34	16	13	119
20	cm	42.5	44.5	44.0	43.8	44.5	43.5	43.8	43.5	43.6	43.6	43.4	44.7	45.3	44.2
	N	2	2	4	4	2	2	16	5	8	21	15	23	23	95

Appendix table 12 cont'd. Mean lengths (cm) and numbers of specimens (N), by age group, 20-fm depth interval, and selected years, for female Pacific ocean perch caught by the R/V *G.B. Reed* in Goose Island Gully (5B+5An), 1966-76 (Source: PBS Scientific Archive DN/2/13).

Age (yr)	120-139 fms								140-159 fms							
		1966	1967	1969	1970	1973	1976	Mean ^a		1966	1967	1969	1970	1973	1976	Mean ^a
10	cm	33.5	33.3	33.3	32.2	35.3	35.8	33.9		33.0	34.5	32.2	31.7	34.1	35.3	33.3
	N	2	5	8	20	15	12	62		2	4	3	25	18	12	64
12	cm	36.4	36.5	36.1	35.3	37.4	37.8	37.1		35.4	36.3	35.5	35.3	37.2	37.5	36.9
	N	10	13	5	5	19	32	84		8	10	3	4	35	29	89
14	cm	38.9	39.0	39.1	38.1	40.1	39.6	39.1		37.7	38.2	38.9	38.1	39.8	39.6	38.7
	N	39	15	10	23	7	41	135		18	36	5	8	6	32	105
16	cm	40.9	42.0	40.7	40.9	41.0	41.6	41.0		38.9	40.0	39.9	40.0	42.3	40.7	40.2
	N	21	11	32	49	7	17	137		11	25	20	17	11	14	98
18	cm	42.5	42.6	42.4	42.4	43.0	43.4	42.6		40.9	41.0	41.8	41.3	43.5	43.0	42.2
	N	9	11	29	49	17	8	123		9	15	18	11	27	11	91
20	cm	42.8	43.6	42.5	43.5	44.0	45.0	43.6		42.2	42.4	42.7	42.1	43.4	44.3	42.8
	N	10	11	11	27	16	11	86		7	11	21	5	13	4	61

^a Weighted to numbers of observations (N).

Appendix table 13. Commercial landings (t), by depth and quarter year, of Pacific ocean perch from Goose Island Gully (5B+5An), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth ^a		I		II		III		IV		Total
(fms)	(m)	(t)	(%)	(t)	(%)	(t)	(%)	(t)	(%)	
11	20	...	...	...	...	1	0.0	...	...	
33	60	...	...	2.0	0.0	12	0.2	0.01	0.0	
55	100	0.2	0.0	57	0.7	103	1.5	9	0.5	
77	140	8	1.3	423	5.2	423	6.2	46	2.5	
98	180	22	3.6	2775	34.3	2209	32.6	497	26.7	
120	220	66	10.7	3718	46.0	1601	23.6	549	29.5	
142	260	142	22.9	580	7.2	548	8.1	552	29.7	
164	300	213	34.4	188	2.3	106	1.6	199	10.7	
186	340	126	20.4	164	2.0	13	0.2	3	0.2	
208	380	26	4.2	118	1.5	1	0.0	0	0	
230	420	12	1.9	42	0.5	2	0.0	4	0.2	
251	460	2	0.3	6	0.1	1	0.0	1	0.1	
273	500	1	0.2	2	0.0	7	0.1	0.1	0.0	
295	540	0.3	0.0	0.2	0.0	4	0.1	0.04	0.0	
317	580	...	...	0	0	1	0.0	...	...	
339	620	...	...	3	0.0	...	...	...	...	
361	660	...	...	1	0.0	...	...	...	...	
Total		(t)	619	99.9	8079	100.0	5032	100.0	1860	100.0
		(%)	4.0		51.8		32.3		11.9	100.0
Mean ^b		(m)	291		212		199		228	
		(fms)	159		116		109		125	
S.D.		(m)	54		47		41		44	
C.V.		(%)	18		22		20		19	

^a Mid-points of 40-m depth intervals (20 = 0-39 m, etc.). Equivalent values in fathoms.

^b Weighted to landings.

Appendix table 14. Mean lengths (mm) and numbers of specimens (N), by depth, age group, and quarter year, of male Pacific ocean perch caught by "other vessels" in Goose Island Gully (5B+5An), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth ^a		10								12							
		I		II		III		IV		I		II		III		IV	
		(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
55	100	...	0	...	0	...	0	...	0	...	0	...	0	358	4	...	0
77	140	...	0	...	0	...	0	...	0	...	0	371	11	...	0	...	0
98	180	...	0	363	15	367	68	360	9	...	0	370	39	374	22	370	9
120	220	...	0	348	11	364	63	360	2	...	0	365	60	377	29	...	0
142	260	345	2	360	2	347	14	...	0	354	12	nil	0	365	7	360	2
164	300	...	0	365	2	340	2	...	0	...	0	369	4	...	0	...	0
186	340	...	0	346	4	...	0	...	0	...	0	...	0	...	0	...	0
208	380	...	0	347	3	...	0	...	0	...	0	363	15	...	0	...	0
230	420	...	0	338	3	...	0	...	0	...	0	356	4	371	2	...	0
251	460	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
273	500	...	0	351	8	...	0	...	0	...	0	351	8	...	0	...	0
Total		2		48		147		11		12		141		64		11	

Appendix table 14 cont'd. Mean lengths (mm) and numbers of specimens (N), by depth, age group, and quarter year, of male Pacific ocean perch caught by "other vessels" in Goose Island Gully (5B+5An), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth ^a		14								16							
		I		II		III		IV		I		II		III		IV	
		(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
55	100	...	0	...	0	...	0	...	0	...	0	...	0	373	3	...	0
77	140	...	0	378	5	391	2	...	0	...	0	392	6	397	3	...	0
98	180	...	0	379	31	385	25	394	6	...	0	379	20	396	19	400	6
120	220	...	0	378	37	381	37	377	3	...	0	386	38	394	19	382	3
142	260	...	0	380	2	367	6	...	0	...	0	368	7	390	5	...	0
164	300	...	0	374	5	357	2	...	0	...	0	...	0	...	0	...	0
186	340	...	0	384	3	...	0	...	0	...	0	...	0	...	0	...	0
208	380	...	0	371	5	...	0	...	0	...	0	374	2	...	0	...	0
230	420	...	0	365	9	381	3	...	0	...	0	...	0	...	0	...	0
251	460	...	0	359	3	...	0	...	0	...	0	...	0	...	0	...	0
273	500	...	0	351	2	324	4	...	0	...	0	...	0	...	0	...	0
Total			0		102		79		9		0		73		46		9

Appendix table 14 cont'd. Mean lengths (mm) and numbers of specimens (N), by depth, age group, and quarter year, of male Pacific ocean perch caught by "other vessels" in Goose Island Gully (5B+5An), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth ^a		18								20							
		I		II		III		IV		I		II		III		IV	
		(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
55	100	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
77	140	...	0	...	0	416	2	...	0	...	0	398	7	405	2	...	0
98	180	...	0	387	22	400	28	393	6	...	0	395	14	407	22	...	0
120	220	...	0	384	26	395	48	397	3	...	0	394	11	409	23	415	2
142	260	...	0	374	3	378	4	...	0	...	0	...	0	395	6	...	0
164	300	...	0	404	6	...	0	...	0	...	0	...	0	404	2	...	0
186	340	...	0	397	4	...	0	...	0	...	0	...	0	...	0	...	0
208	380	...	0	387	15	...	0	...	0	...	0	...	0	...	0	...	0
230	420	...	0	383	10	395	2	...	0	...	0	...	0	...	0	...	0
251	460	...	0	386	2	...	0	...	0	...	0	...	0	...	0	...	0
273	500	...	0	373	6	...	0	...	0	...	0	...	0	...	0	...	0
Total		0		94		84		9		0		32		55		2	

^a Mid-points of 40-m depth intervals (100 = 80-119, etc.). Equivalent values in fathoms.

Appendix table 15. Mean lengths (mm) and numbers of specimens (N), by depth, age group, and quarter year, of female Pacific ocean perch caught by "other vessels" in Goose Island Gully (5B+5An), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth ^a		10								12							
		I		II		III		IV		I		II		III		IV	
(fm)	(m)	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
55	100	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
77	140	...	0	...	0	...	0	...	0	...	0	388	4	...	0	...	0
98	180	...	0	366	15	373	63	384	14	...	0	374	32	397	19	392	5
120	220	...	0	369	21	374	58	368	4	...	0	383	38	389	39	385	6
142	260	...	0	...	0	369	11	...	0	358	12	...	0	384	7	372	6
164	300	...	0	346	3	...	0	...	0	...	0	387	3	406	5	...	0
186	340	...	0	350	6	...	0	...	0	...	0	378	2	...	0	...	0
208	380	...	0	353	9	348	2	...	0	...	0	379	2	384	3	...	0
230	420	...	0	342	10	346	1	...	0	...	0	361	7	...	0	...	0
251	460	...	0	342	3	...	0	...	0	...	0	...	0	...	0	...	0
273	500	...	0	348	6	348	2	...	0	...	0	349	10	362	3	...	0
295	540	...	0	...	0	...	0	...	0	...	0	364	2	...	0	...	0
Total		0		73		137		18		12		100		76		17	

Appendix table 15 cont'd. Mean lengths (mm) and numbers of specimens (N), by depth, age group, and quarter year, of female Pacific ocean perch caught by "other vessels" in Goose Island Gully (5B+5An), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth ^a (fm) (m)		14								16							
		I		II		III		IV		I		II		III		IV	
		(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
55	100	...	0	...	0	...	0	...	0	...	0	...	0	403	3	...	0
77	140	...	0	408	4	...	0	...	0	...	0	424	5	406	2	...	0
98	180	...	0	395	13	404	18	...	0	...	0	407	27	419	25	416	5
120	220	...	0	396	37	395	38	...	0	...	0	418	27	409	38	409	8
142	260	...	0	385	15	398	12	385	2	...	0	401	7	381	5	...	0
164	300	...	0	381	3	390	5	...	0	...	0	399	2	...	0	...	0
186	340	...	0	397	12	...	0	...	0	...	0	...	0	...	0	...	0
208	380	...	0	394	9	...	0	...	0	...	0	...	0	...	0	...	0
230	420	...	0	379	12	...	0	...	0	...	0	402	3	...	0	...	0
251	460	...	0	400	3	...	0	...	0	...	0	...	0	...	0	...	0
273	500	...	0	374	11	...	0	...	0	...	0	420	5	...	0	...	0
295	540	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
Total		0		119		73		2		0		76		73		13	

Appendix table 15 cont'd. Mean lengths (mm) and numbers of specimens (N), by depth, age group, and quarter year, of female Pacific ocean perch caught by "other vessels" in Goose Island Gully (5B+5An), 1980-99 (Source: PBS Groundfish Data Base, GFBio).

Depth ^a (fm) (m)		18								20							
		I		II		III		IV		I		II		III		IV	
		(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N	(mm)	N
55	100	...	0	...	0	...	0	...	0	...	0	...	0	...	0	...	0
77	140	...	0	410	2	...	0	...	0	...	0	445	5	430	4	...	0
98	180	...	0	407	11	425	28	419	7	...	0	430	5	429	7	...	0
120	220	...	0	415	11	421	35	440	2	...	0	422	12	426	26	437	7
142	260	...	0	418	11	405	7	...	0	...	0	nil	0	430	5	...	0
164	300	...	0	438	2	407	3	...	0	...	0	nil	0	...	0	...	0
186	340	...	0	419	8	427	4	...	0	...	0	nil	0	...	0	...	0
208	380	...	0	417	20	...	0	...	0	...	0	435	3	...	0	...	0
230	420	...	0	417	13	...	0	...	0	...	0	nil	0	...	0	...	0
251	460	...	0	424	3	...	0	...	0	...	0	nil	0	...	0	...	0
273	500	...	0	413	9	...	0	...	0	...	0	nil	0	...	0	...	0
295	540	...	0	...	0	...	0	...	0	...	0	nil	0	...	0	...	0
Total			0		90		77		9		0		25		42		7

^a Mid-points of 40-m depth intervals (100 = 80-119, etc.). Equivalent values in fathoms.

